

# Middle School Science: Curriculum Map for Grade 8

## Third Nine Weeks

State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
<b>Unit 3.1 Acids and Bases, 3 weeks</b>				
<p>GLE 0807.9.2 Explain that matter has properties that are determined by the structure and arrangement of its atoms.</p> <p>GLE 0807.9.9 Explain the basic difference between acids and bases.</p>	<p>GLE 0807.Inq.1 Design and conduct open-ended scientific investigations.</p> <p>GLE 0807.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p> <p>GLE 0807.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.</p>	<p>Create a classification system for common household substances by observing reactions with an indicator.</p> <p>Classify common substances as acid, base, or neutral by observing reactions with an indicator.</p> <p>Compare and contrast the properties and uses of acids and bases.</p> <p>Use the pH scale to compare the strengths of a variety of acids and bases.</p> <p>Design an experiment to determine what happens when an acid is mixed with a base.</p> <p>Construct a word equation for a neutralization reaction.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 14, section 2: Acids and Bases and pH section 3: Solutions of Acids and Bases, p. 368-377.</p> <p>Gizmo: pH Analysis</p>	<p>NGSS Practice 3: Planning and carrying out investigation.</p> <p>NGSS Practice 4: Analyzing and interpreting data.</p> <p>NGSS Practice 8: Obtaining, evaluating, and communicating information.</p> <p>CCSS Mathematics: Define, evaluate, and compare functions.</p> <p>CCSS Reading: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>CCSS Writing: Use precise language and domain- specific vocabulary to inform about or explain the topic</p>

\*The TOOLBOX contains additional resources for each unit.

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<b>Unit 3.2 Adapting to the Environment, 4 weeks</b>				
<p>GLE 0807.5.4 Explain why variation within a population can enhance the chances for group survival.</p> <p>GLE 0807.5.3 Analyze how structural, behavioral, and physiological adaptations within a population enable it to survive in a given environment.</p> <p>GLE 0807.5.6 Investigate fossils in sedimentary rock layers to gather evidence of changing life forms.</p> <p>GLE 0807.5.5 Describe the importance of maintaining the earth's biodiversity.</p>	<p>GLE 0807.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p> <p>GLE 0807.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration.</p> <p>GLE 0807.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.</p> <p>GLE 0607.T/E.3 Compare the intended benefits with the unintended consequences of a new technology.</p>	<p>Make inferences about the habitat of an organism from information about structural, behavioral, and physiological adaptations.</p> <p>Evaluate the survival value of an adaptation by analyzing data from experiments or simulations.</p> <p>Investigate fossils in sedimentary rocks to gather evidence of changing life forms.</p> <p>Predict ability of an organism to survive under different environmental conditions.</p> <p>Summarize how genetic variation, natural selection, and adaptations combine to enhance the chances for group survival.</p> <p>Assess the importance of maintaining the earth's diversity.</p> <p>Use print and electronic resources to research the effect of a catastrophic event, selective pressures, or human activities on the biodiversity of a biome.</p>	<p><i>Tennessee Holt Science and Technology TE</i>            Chapter 4 -sections 2:How Do Population Changes Happen and Section 3: Natural Selection in Action p. 108-117            Chapter 3 - section 4:Adaptations and Survival p.84-89            Chapter 5 - section 1:Geological History and Section 2: Looking at Fossils p.126-139            Chapter 6 - section 2: Environmental Solutions p.162-169</p> <p>Gizmo- Natural Selection; Evolution: Artificial and Natural Selection; Rainfall and Bird Beaks</p>	<p>NGSS Practice 4: Analyzing and interpreting data</p> <p>NGSS Practice 6: Constructing explanations (for science) and designing solutions (for engineering)</p> <p>NGSS Practice 7: Engaging in argument from evidence</p> <p>CCSS Mathematics: Investigate chance processes and develop, use, and evaluate probability models.</p> <p>CCSS Writing: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.</p> <p>CCSS Writing: Support claims with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p>

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<b>Unit 3.1 Classification, 2 weeks</b>				
<p>GLE 0807.5.1 Identify various criteria used to classify organisms into groups.</p> <p>GLE 0807.5.2 Use a simple classification key to identify a specific organism.</p>	<p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p> <p>GLE 0807.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.</p>	<p>Justify groupings of selected organisms (or information/photo cards of organisms) by identifying the sorting criteria.</p> <p>Use print and electronic resources to identify the criteria used for biological classification of selected organisms.</p> <p>Construct a classification key to identify a selected group of organisms.</p> <p>Use a classification key to identify an unknown organism.</p> <p>Infer how classification systems and keys are useful to biologists.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 2 section 1: Sorting It All Out and Section 2: Domains and Kingdoms p. 46-59</p> <p>Gizmo: Dichotomous Keys</p>	<p>NGSS Practice 2: Developing and using models</p> <p>NGSS Practice 7: Engaging in argument from evidence</p> <p>CCSS Writing: Support claims with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p>

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TOOLBOX	
Unit 3.1 Acids and Bases, 3 weeks	
Plans	<p>The GEMS module <i>Of Cabbages and Chemistry</i> contains a series of engaging lessons in which students explore acids and bases using red cabbage juice as an indicator. Students discover acids and bases through their own experiments and interpretations. The Teacher's Guide (about \$25) containing this unit plan is available from Lawrence Hall of Science <a href="http://www.lhsgems.org">www.lhsgems.org</a> and the guide with a complete kit of materials (about \$270) is available from Carolina <a href="http://www.carolinacurriculum.com">www.carolinacurriculum.com</a>.</p> <p>Students see a demonstration of a color change using universal pH indicator. Students change the concentrations of an acid and a base and use universal indicator to test the pH of the resulting solutions. Students see an animation showing that water molecules interact and separate into the <math>H_3O^+</math> ion and the <math>OH^-</math> ion. Students see that the pH of a solution is related to the concentration of these ions in water. This lesson plan is available at <a href="http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson8">http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson8</a></p> <p>Students use citric acid and sodium carbonate solutions to see that adding a base to an acidic solution makes the solution less acidic. Students then use a base to help them identify which of two acidic solutions is more concentrated. This lesson plan is available at <a href="http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson9">http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson9</a></p>
Background for Teachers	<p>A one-page summary defining acids and bases is available at <a href="http://www.acidsandbases.org/">http://www.acidsandbases.org/</a></p> <p>A more complete explanation of the properties and reactions of acids and bases is available at <a href="http://www.chemtutor.com/acid.htm">http://www.chemtutor.com/acid.htm</a></p> <p>A virtual chemistry book at <a href="http://www.elmhurst.edu/~chm/vchembook/180acidsbases.html">http://www.elmhurst.edu/~chm/vchembook/180acidsbases.html</a> explains concepts related to acid-base chemistry and provides links to animations, videos, and related information at other websites.</p>
Student Activities	<p>Directions for a lab investigation into the properties of acids and bases using cabbage juice indicator is available at <a href="http://www.inquiryinaction.org/classroomactivities/activity.php?id=27">http://www.inquiryinaction.org/classroomactivities/activity.php?id=27</a></p> <p>In this activity, students will use their knowledge of color changes with red cabbage indicator to neutralize an acidic solution with a base and then neutralize a basic solution with an acid. Find directions for this lab at <a href="http://www.inquiryinaction.org/classroomactivities/activity.php?id=28">http://www.inquiryinaction.org/classroomactivities/activity.php?id=28</a></p> <p>A hands-on activity that relates acid-base chemistry to engineering is described at <a href="http://www.teachengineering.org/view_activity.php?url=collection/cub/_activities/cub_air/cub_air_lesson06_activity1.xml">http://www.teachengineering.org/view_activity.php?url=collection/cub/_activities/cub_air/cub_air_lesson06_activity1.xml</a></p>
Other Resources	<p>This webpage host an interactive Java Applet simulation that allows the student to test the pH of things like coffee, spit, and soap to determine whether each is acidic, basic, or neutral. Also it helps the student user to visualize the relative number of hydroxide ions and hydronium ions in solution. The user is able to switch between logarithmic and linear scales. This website's applet will give students a simulated, visual learning experience they might otherwise not be able to engage in due to time restraints or lack of material. <a href="http://phet.colorado.edu/en/simulation/ph-scale">http://phet.colorado.edu/en/simulation/ph-scale</a></p>

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TOOLBOX	
Unit 3.2 Adapting to the Environment, 4 weeks	
Plans	<p>A free lesson plan from Biology Alliance about natural selection <a href="http://www.nku.edu/~bowlingb2/NaturalSelection.html">http://www.nku.edu/~bowlingb2/NaturalSelection.html</a>.</p> <p><i>Exploring Environmental Issues: Biodiversity</i> was developed by Project Learning Tree in partnership with the World Wildlife Fund. Students learn that decisions about growth and development, energy use and water quality, and even human health, all rest to some extent on perspectives about biodiversity. This module can be downloaded at no cost. <a href="http://www.plt.org/biodiversity">http://www.plt.org/biodiversity</a></p> <p>This online simulation allows students to manipulate factors that influence species survival (adaptation, overproduction, variation, and competition). <a href="http://phet.colorado.edu/en/simulation/natural-selection">http://phet.colorado.edu/en/simulation/natural-selection</a>. This is a complete lesson. Your computer must meet minimal requirements. The videos included are links to YouTube.</p>
Background for Teachers	<p>A simple explanation of natural selection, genetic variations, and adaptations is available at <a href="http://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_14">http://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_14</a>. Use the links on the left side of the page.</p> <p>A more complex explanation of the Theory of Natural Selection <a href="http://www.biology-online.org/2/10_natural_selection.htm">http://www.biology-online.org/2/10_natural_selection.htm</a></p> <p>A quick explanation of the types of adaptations is available at "How Stuff Works" - <a href="http://science.howstuffworks.com/dictionary/biology-terms/adaptation-info.htm">http://science.howstuffworks.com/dictionary/biology-terms/adaptation-info.htm</a> Another summary about adaptations <a href="http://www.biologyreference.com/A-Ar/Adaptation.html">http://www.biologyreference.com/A-Ar/Adaptation.html</a>.</p> <p>A one page summary about biodiversity <a href="http://www.nwf.org/Wildlife/Wildlife-Conservation/Biodiversity.aspx">http://www.nwf.org/Wildlife/Wildlife-Conservation/Biodiversity.aspx</a>.</p>
Student Activities	<p>In this lab, you will simulate how predators locate prey in different environments. You will analyze how color affects and organism's ability to survive in certain environments. <a href="http://www.biologycorner.com/worksheets/peppermoth_paper.html">http://www.biologycorner.com/worksheets/peppermoth_paper.html</a>.</p> <p>In this hands-on activity, students <b>become</b> the subjects in a demonstration of natural selection. Students select candies from a bowl and have an opportunity to think about what traits brought about the "survival" of some candies. <a href="http://www.ucmp.berkeley.edu/education/lessons/candy_dish.html">http://www.ucmp.berkeley.edu/education/lessons/candy_dish.html</a>.</p> <p>This is a natural selection simulation. In this activity students demonstrate how natural selection operates, using different colored paper chips to represent prey and a piece of fabric as a background (the environment). The predator (student) will hunt (select chips) to show that the best adapted, by color, are NOT chosen, and others which are poorly adapted (by standing out) ARE chosen (removed). <a href="http://www.indiana.edu/~ensiweb/lessons/ns.chips.html">http://www.indiana.edu/~ensiweb/lessons/ns.chips.html</a>.</p>
Other Resources	<p>In this natural selection simulation students solve the problem concerning the evolution of seed color in pinto bean plants. Students use the constructivist approach to learning as they work in teams to design and conduct an experiment that solves this natural selection "problem." <a href="http://www.accessexcellence.org/AE/AEPC/WWC/1995/beansbirds.php">http://www.accessexcellence.org/AE/AEPC/WWC/1995/beansbirds.php</a></p> <p>This is a classroom investigation about natural selection. Students will examine photographs of closely related species found in the Galapagos environment, observe differences and similarities between the species, and form hypotheses about species differences and the relationship to the environment of the Galápagos' Islands. Computers are needed. <a href="http://www.nsta.org/publications/interactive/galapagos/activities/adaptations.html">http://www.nsta.org/publications/interactive/galapagos/activities/adaptations.html</a>.</p>

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Unit 3.1 Classification, 2 weeks	
<b>Plans</b>	<p>Lesson Plan: Biological classification -Students explore how improved understanding of organisms leads to revision in our system of biological classification. They are introduced to the three domains, as well as the more traditional hierarchy of kingdoms. They begin to understand that our classification system attempts to show relationships among organisms. A research activity in which students investigate the traditional kingdom hierarchy is described at the following website: <a href="http://www.nsta.org/pdfs/pdlinks/ss0111_36.pdf">http://www.nsta.org/pdfs/pdlinks/ss0111_36.pdf</a></p> <p>Lesson Plan: Classification key - Students are introduced to the techniques used in developing a dichotomous key. They use what they have learned in previous lessons to prepare a graphical and written dichotomous key for the identification of selected organisms. An introductory activity is described at the following website: <a href="http://www.agnesplumm.com/documents/preposterous_dichotomous_keys.pdf">http://www.agnesplumm.com/documents/preposterous_dichotomous_keys.pdf</a></p> <p>Two lesson plans on classification and dichotomous keys are found at <a href="http://www.tncurriculumcenter.org/learning_expectation/66">http://www.tncurriculumcenter.org/learning_expectation/66</a>. These include <i>Preposterous Dichotomous Keys</i>, <a href="http://www.tncurriculumcenter.org/resource/2330">http://www.tncurriculumcenter.org/resource/2330</a>, which allows students to learn and create classification keys in creative ways, and <i>Potato Chip Classification</i>, <a href="http://www.tncurriculumcenter.org/resource/3467/go">http://www.tncurriculumcenter.org/resource/3467/go</a> which introduces the structure and function of dichotomous keys. The lessons from this site have been selected by Tennessee science teacher and vetted by University science professors.</p> <p>Classify That! Lesson plan including handouts on classification from AAAS. <a href="http://sciencenetlinks.com/lessons/classify-that/">http://sciencenetlinks.com/lessons/classify-that/</a></p>
<b>Background for Teachers</b>	<p>The Open Door website is maintained by science teachers and it includes information for science educators about the following:</p> <p>Groups of Animals <a href="http://www.saburchill.com/chapters/chap0002.html">http://www.saburchill.com/chapters/chap0002.html</a>            Collecting, Describing &amp; Classifying <a href="http://www.saburchill.com/chapters/chap0109.html">http://www.saburchill.com/chapters/chap0109.html</a>            How Biologists Classify Species <a href="http://www.saburchill.com/chapters/chap0110.html">http://www.saburchill.com/chapters/chap0110.html</a>            Putting Things into Groups 1 <a href="http://www.saburchill.com/chapters/chap0111.html">http://www.saburchill.com/chapters/chap0111.html</a>            Putting Things into Groups 2 <a href="http://www.saburchill.com/chapters/chap0112.html">http://www.saburchill.com/chapters/chap0112.html</a></p> <p>Encyclopedia of Life <a href="http://eol.org/info/discover_articles">http://eol.org/info/discover_articles</a> has pictures, articles, maps, information about the species of life on Earth. The article, "What is Biological Classification?" at this link <a href="http://eol.org/info/taxonomy_phylogenetics">http://eol.org/info/taxonomy_phylogenetics</a> has extensive information about this subject.</p>
<b>Student Activities</b>	<p>Every day you classify. Think about it. Sorting objects and putting them in a specific place is classification. Do you have a sock drawer in your dresser? How about a cabinet in your kitchen for storing your cups and saucers? Do you collect baseball cards or stamps? Practice classifying objects according to physical structure and characteristics.</p> <p>A tutorial for students that explains classification in a series of web pages can be found at <a href="http://www.kidsbiology.com/biology_basics/classification/classification1.php">http://www.kidsbiology.com/biology_basics/classification/classification1.php</a></p>
<b>Other Resources</b>	<p>This is a smartboard lesson about classifying plants. Links to videos and activities are available on this website <a href="http://www.brightubeducation.com/middle-school-science-lessons/92920-smart-board-lesson-on-plant-classification/">http://www.brightubeducation.com/middle-school-science-lessons/92920-smart-board-lesson-on-plant-classification/</a>.</p>

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