

Middle School Science: Curriculum Map for Grade 8

First Nine Weeks

State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
Unit 1.1 Properties of Matter, 3 weeks				
<p>GLE 0807.9.2: Explain that matter has properties that are determined by the structure and arrangement of its atoms.</p> <p>GLE 0807.9.3: Interpret data from an investigation to differentiate between physical and chemical changes.</p>	<p>GLE 0807.Inq.2: Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.Inq.1: Design and conduct open-ended scientific investigations.</p> <p>GLE 0807.Inq.5: Communicate scientific understanding using descriptions, explanations, and models.</p> <p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p>	<p>Use appropriate tools and techniques to measure mass, volume, and temperature of matter.</p> <p>Design and conduct investigations to determine the physical and chemical properties of matter.</p> <p>Calculate the density of matter using data collected in an investigation.</p> <p>Compare densities of matter, using a density column, tank of water, and mathematics..</p> <p>Discriminate between physical and chemical changes.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 7 Section 1: What is Matter? and Section 2: Physical Properties and Section 3: Chemical Properties p. 180-199.</p> <p><i>STCMS Properties of Matter TG</i>: Lessons 2-4, p. 15-48.</p> <p>Gizmos: Measuring Volume; Density Laboratory</p>	<p>NGSS Practice 3: Planning and carrying out investigations</p> <p>NGSS Practice 4: Analyzing and interpreting data</p> <p>NGSS Practice 5: Using mathematics and computational thinking</p> <p>CCSS Mathematics: Define, evaluate, and compare functions.</p> <p>CCSS Mathematics: Use appropriate tools strategically.</p> <p>CCSS Reading: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>CCSS Writing: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>

*The TOOLBOX contains additional resources for each unit.

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State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
Unit 1.2 Phases of Matter, 2 weeks				
<p>GLE 0807.9.1: Understand that all matter is made up of atoms.</p> <p>GLE 0807.9.2: Explain that matter has properties that are determined by the structure and arrangement of its atoms.</p> <p>GLE 0807.9.3 Interpret data from an investigation to differentiate between physical and chemical changes.</p> <p>GLE 0807.9.5: Apply the chemical properties of the atmosphere to illustrate a mixture of gases.</p>	<p>GLE 0807.Inq.2: Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.Inq.1: Design and conduct open-ended scientific investigations.</p> <p>GLE 0807.Inq.5: Communicate scientific understanding using descriptions, explanations, and models.</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>Design and conduct investigations to determine the effects of changes in temperature, pressure and volume on the density and state of matter.</p> <p>Evaluate the relationships between pressure, volume and temperature of a gas.</p> <p>Construct graphics that illustrate the energy changes during a phase change.</p> <p>Diagram and explain the behavior of particle movement in solids, liquids, and gases.</p> <p>Explain how the chemical makeup of the atmosphere illustrates a mixture of gases.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 8, Section 1: Three States of Matter and Section 2: Behavior of Gases and Section 3: Changes of State p. 208 - 223</p> <p><i>STCMS Properties of Matter TG</i>: Lessons 6 – 9, p. 65 - 109.</p> <p>Gizmos: Phases of Water; Mystery Powder Analysis</p>	<p>NGSS Practice 3: Planning and carrying out investigations</p> <p>NGSS Practice 2: Developing and using models</p> <p>CCSS Reading: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.</p> <p>CCSS Mathematics: Use appropriate tools strategically.</p> <p>CCSS Reading: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p>

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State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
Unit 1.3 Elements, Compounds, and Mixtures, 3 weeks				
<p>GLE 0807.9.1: Understand that all matter is made up of atoms.</p> <p>GLE 0807.9.4: Distinguish between elements, compounds, and mixtures</p> <p>GLE0807.9.6: Use the periodic table of elements to determine the characteristics of an element.</p>	<p>GLE 0807.Inq.1: Design and conduct open-ended scientific investigations.</p> <p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p>	<p>Design and conduct an investigation to discriminate between types of mixtures.</p> <p>Demonstrate that the properties of a compound are different from the properties of its component elements.</p> <p>Differentiate between elements and compounds using chemical symbols and formulas.</p> <p>Relate the word "element" to "compound" and "atom" to "molecule."</p> <p>Demonstrate a variety of methods to separate the components of compounds and mixtures.</p> <p>Justify the classification of mixtures and compounds by their properties.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 9, Section 1: Elements and Section 2: Compounds and Section 3: Mixtures p. 232-249.</p> <p>Chapter12, Section 1:Electrons and Chemical Bonding p. 314-317.</p> <p><i>STCMS Properties of Matter TG</i>: Lessons 11,15-17, and 20, p. 125-134, 161-192, and 227-240.</p> <p>Gizmos: Solubility and Temperature</p>	<p>CCSS Reading: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>CCSS Writing: Provide a concluding statement or section that follows from and supports the argument presented.</p> <p>CCSS Writing: Use precise language and domain-specific vocabulary to inform about or explain the topic.</p> <p>CCSS Mathematics: Use appropriate tools strategically.</p> <p>NGSS Practice 7: Engaging in argument from evidence</p>

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TOOLBOX	
Unit 1.1 Properties of Matter, 3 weeks	
Plans	<p>American Chemical Society (ACS) Lesson about Density: Students will be able to calculate the density of different cubes and use these values to identify the substance each cube is made of. Students will be able to explain that the size, mass, and arrangement of the atoms or molecules of a substance determine density. http://www.middleschoolchemistry.com/lessonplans/chapter3/lesson1</p> <p>ACS lesson about density of solids: Students will investigate a wax candle and a piece of clay to understand why the candle floats and the clay sinks even though the candle is heavier than the piece of clay. Students will discover that it is not the weight of the object, but its density compared to the density of water, that determines whether an object will sink or float in water. http://www.middleschoolchemistry.com/lessonplans/chapter3/lesson4</p> <p>ACS lesson about density of liquids: Students will observe three household liquids stacked on each other and conclude that their densities must be different. They will predict the relative densities of the liquids and then measure their volume and mass to see if their calculations match their observations and predictions. http://www.middleschoolchemistry.com/lessonplans/chapter3/lesson5</p>
Unit 1.1 Properties of Matter	<p>A concise review of properties of matter can be found at the following website: http://www.infoplease.com/encyclopedia/science/matter.html</p> <p>Review the particle theory of states of matter at the following website: http://www.chem.purdue.edu/gchelp/atoms/states.html</p>
Background for Teachers	<p>If you've been assigned to teach principles of chemistry, but haven't studied the topic recently (or perhaps ever!) consult the following website and select the topics for review: http://www.inquiryinaction.org/chemistryreview/</p>
Unit 1.1 Properties of Matter	<p>Online tutorial including calculations on density of solids: http://www.edinformatics.com/math_science/density.htm</p> <p>Online tutorial including calculations on density of liquids: http://www.edinformatics.com/math_science/dens_liquid.htm</p>
Student Activities	<p>This website provides a printable lab guide for students to compare the densities of colas. http://www.middleschoolscience.com/dietcoke.htm</p>
Other Resources	<p>An online quiz requires students to classify each given change as physical or chemical. There are no tutorials to assist struggling learners.: http://www.quia.com/quiz/303980.html</p> <p>This website gives definitions, examples and general information about matter. http://www.chem4kids.com/files/matter_intro.html</p> <p>Information about Physical and Chemical changes: http://www.chem4kids.com/files/matter_chemphys.html</p> <p>Information about atoms: http://www.chem4kids.com/files/atom_structure.html</p>

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BCS 2014

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Unit 1.2 Phases of Matter, 2 weeks	
Plans	<p>American Chemical Society (ACS) lesson plan for melting: Students will see a small piece of ice melt on an aluminum surface. Students will explain the energy transfer and molecular motion which cause the change in state from a solid to a liquid. Students will see and discuss an animation of ice melting and compare the state changes of water to the state changes of other substances. They will also investigate sublimation of dry ice through a teacher demonstration, or video if dry ice is not readily available. http://www.middleschoolchemistry.com/lessonplans/chapter2/lesson5</p> <p>ACS lesson about solids: Students will see a demonstration with a metal ball and ring showing that heat causes atoms to spread a little further apart. They will also see that cooling a solid causes the atoms to get a little closer together. The same rules they discovered about liquids also apply to solids. http://www.middleschoolchemistry.com/lessonplans/chapter1/lesson4</p> <p>ACS Lesson about gases: This lesson focuses on molecular motion in gases. Students compare the mass of a basketball when it is deflated and after it has been inflated. The inflated ball has the greater mass so students can conclude that gas is matter because it has mass and takes up space. Then students consider how heating and cooling affect molecular motion in gases. They dip the mouth of a bottle in detergent solution and observe a bubble growing and shrinking when the bottle is warmed and cooled. Students will learn that the attractions between gas molecules are so minimal that attractions can't be used to explain the behavior of gases like it can for liquids and solids. http://www.middleschoolchemistry.com/lessonplans/chapter1/lesson4</p>
Background for Teachers	<p>Review the particle theory of states of matter at the following website: http://www.chem.purdue.edu/qchelp/atoms/states.html</p> <p>A quick summary of the phases of matter is provided at the following website: http://chemistry.about.com/od/lecturenotes13/a/statesmatter.htm</p> <p>The following website presents a Khan Academy video lecture introduction to the phases of matter. There is also a discussion thread with interesting questions that students might ask. Answers are provided. http://www.khanacademy.org/science/chemistry/states-of-matter/v/states-of-matter</p>
Student Activities	<p>Directions for an activity to construct models of the states of matter using petri dishes and BBs is provided at the following website: http://www.kingsford.org/khsWeb/rfs/elemsci/sg.html</p> <p>Watch different types of molecules form a solid, liquid, or gas. Add or remove heat and watch the phase change. Change the temperature or volume of a container and see a pressure-temperature diagram respond in real time. Relate the interaction potential to the forces between molecules. http://phet.colorado.edu/en/simulation/states-of-matter</p> <p>Using this simulation students read a heating curve graph after a simulating heating experiment However, some students may need assistance in understanding the simulation: http://www.harcourtschool.com/activity/hotplate/index.html</p>
Other Resources	<p>10 question quick online assessment: Pearson Self-Assessment On-line</p> <p>A great refresher about the phases of matter: http://www.chem4kids.com/files/matter_states.html</p>

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Unit 1.3 Elements, Compounds, and Mixtures, 3 weeks	
Plans	
Background for Teachers	<p>Online general chemistry contains lecture notes, quizzes, and links to additional websites for learning or reviewing compounds and molecules. http://antoine.frostburg.edu/chem/senese/101/compounds/index.shtml</p> <p>The PBS two-hour special, "Hunting the Elements," can provide an engaging way to learn more about elements, compounds, and the periodic table. http://www.pbs.org/wgbh/nova/physics/hunting-elements.html</p> <p>A one-page summary comparing elements and compounds can be viewed at the following website: http://www.chem.purdue.edu/qchelp/atoms/elements.html</p>
Student Activities	<p>Students create a project about an element: http://sciencespot.net/Media/adtelemptj.pdf</p> <p>Explore chromatography with your students by making a string of "light bulbs!" Students cut light bulb shapes out of coffee filters or filter paper and use water-soluble markers, pipe cleaners, and water to create a colorful display. http://sciencespot.net/Pages/classchem.html#Anchorhalls</p>
Other Resources	<p>A great place to find lots of information about all elements: www.webelements.com</p> <p>Information about Solutions and Mixtures: http://www.chem4kids.com/files/matter_solution.html</p> <p>More information about Mixtures: http://www.chem4kids.com/files/matter_mixture2.html and http://www.chem4kids.com/files/matter_mixture.html and http://www.chem4kids.com/files/matter_mixtureex.html</p> <p>Information about Compounds: http://www.chem4kids.com/files/atom_compounds.html</p>

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