

Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Advanced Earth Science 8	Unit 1 Title:	Matter and Measurement	Grade Level(s):	8
Assessed Trimester:	Trimester 1	Pacing:	7-10 weeks Students will work through regular material in approximately 3 days per week with additional days for enrichment.	Date Created:	6/17/2013	Last Revision Date:	6/16/2014

Course Understandings: <i>Students will understand that:</i> <ul style="list-style-type: none">Materials within the Earth’s systems have physical/chemical properties that make them useful in different ways.Scientific inquiry is a way of processing information about their world through the interactions among technology, engineering, and mathematics.Scientific investigations involve asking testable questions; different kinds of questions suggest different scientific investigations; and findings of current investigations will guide future investigations.Many cultures and groups have been and continue to be involved in advancements in engineering, exploration, and inquiry.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals
Benchmark: <p>8.1.3.4.2 (6.1.3.4.1 - same benchmark): Determine and use appropriate safety procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context (Review-check understanding)</p> <p>7.2.1.1.1: Recognize that all substances are composed of one or more of approximately one hundred elements and that the periodic table organizes the elements into groups with similar properties.</p> <p>8.2.1.2.2: Distinguish between chemical and physical changes in matter.</p> <p>8.2.1.2.3: Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system.</p> <p>6.2.1.1.1: Explain density, dissolving, compression, diffusion, and thermal expansion using the particle model of matter. (Review-check understanding)</p> <p>6.2.1.2.1: Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials.</p> <p>7.2.1.1.2: Describe the differences between elements and compounds, in terms of atoms and molecules. Describe the properties of an element on the periodic table in terms of atomic mass, proton, neutron, and electron.</p> <p>7.2.1.1.3: Recognize that a chemical equation describes a reaction where pure substances change to produce one or more different substances whose properties are different from the original substance(s).</p> <p>8.2.1.1.1: Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point, and boiling point to separate mixtures and identify pure substances.</p> <p>8.2.1.1.2: Use physical properties to distinguish between metals and non-metals.</p> <p>8.2.1.2.1: Identify evidence of chemical changes, including color change, generation of a gas, solid formation, and temperature change.</p> <p>8.2.1.2.4: Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.</p> <p>Literacy Benchmark:</p> <p>6.13.3.3: Follow precisely a multistep procedure when carrying out experiments, designing solutions, taking measurements, or performing technical tasks.</p> <p>6.13.4.4: Determine the meaning of symbols, equations, graphical representations, tabular representations, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6–8 texts and topics</i>.</p> <p>6.13.7.7: Compare and integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, table, map).</p> <p>6.13.1.1: Cite specific textual evidence to support analysis of science and technical texts.</p> <p>6.13.2.2: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p> <p>6.13.9.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>6.13.10.10: By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.</p> <p>6.14.2.2: Write informative/explanatory texts, as they apply to each discipline and reporting format, including the narration of historical events, of scientific procedures/ experiments, or description of technical processes.</p>

<div>a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.</div> <div>b. Develop the topic with relevant, credible, sufficient, and well-chosen facts, definitions, concrete details, quotations, or other information and examples.</div> <div>c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.</div> <div>d. Use precise language and domain-specific vocabulary to inform about or explain the topic.</div> <div>e. Establish and maintain a formal style and objective tone.</div> <div>f. Provide a concluding statement or section that follows from and supports the information or explanation presented.</div> <div>6.14.4.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to discipline, task, purpose, and audience.</div> <div>6.14.5.5: With some guidance and support from peers and adults, use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach, focusing on how well purpose, discipline, and audience have been addressed.</div> <div>6.14.6.6: Use technology, including, but not limited to, the Internet, to produce and publish writing and multi-media texts, and present the relationships between information and ideas clearly and efficiently.</div> <div>6.14.7.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</div> <div>6.14.8.8: Gather relevant information from multiple data, print, physical (e.g., artifacts, objects, images), 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.</div> <div>6.14.9.9: Draw evidence from literary or informational texts to support analysis, reflection, and research.</div> <div>6.14.10.10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.</div>	
Transfer	
<div>Students will be able to independently use their learning to: (product, high order reasoning)</div> <div><div>• Construct and analyze a data table and line graph using scientific data.</div><div>• Apply their understanding of elements to analyze the structure and uses of elements.</div><div>• Use their knowledge of the scientific process to answer testable questions.</div><div>• Collect and analyze data to draw scientific conclusions.</div><div>• Share research and findings.</div></div>	
Meaning	
<div>Unit Understanding(s):</div> <div>Students will understand that:</div> <div><div>• An atom is the basic unit of matter and use that to explain that everything in the universe is composed of matter and energy.</div><div>• Physical and chemical properties can be used to organize and classify matter.</div><div>• All the matter in the universe is characterized in the Periodic Table of the Elements, which can help us understand the properties of each element.</div><div>• Interactions between atoms cause chemical changes that produce new substances with different chemical properties.</div><div>• Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.</div></div>	<div>Essential Question(s):</div> <div>Students will keep considering:</div> <div><div>• How are matter and energy similar and how are they different?</div><div>• How is the Periodic Table of the Elements used to help us understand matter?</div><div>• How do physical and chemical changes affect matter?</div><div>• How can the scientific method be used to answer self-generated questions?</div></div>
Acquisition	
<div>Knowledge - Students will:</div> <div><div>• Students will need to know how to operate common scientific instruments including; electronic balances, metric rulers, graduated cylinders, Celsius thermometers, Vernier probes, and computers. (8.1.3.4.2)</div><div>• Students will know what the appropriate lab safety procedures are. (8.1.3.4.2))</div></div>	<div>Reasoning - Students will:</div> <div><div>• Students will be able to analyze and interpret graphs and data. (8.1.3.4.2)</div><div>• Students will compare the densities of different substances. (6.2.1.1.1)</div><div>• Students will predict the effect on mass of a physical change in a closed system. (8.2.1.2.3)</div><div>• Students will distinguish between elements and compounds in terms of atoms and molecules.</div></div>

<ul style="list-style-type: none">• Students will be able to explain density, dissolving, compression, diffusion, and thermal expansion using the particle model of matter. (6.2.1.1.1)• Students will be able to calculate density. (6.2.1.1.1)• Students need to know the particle model of matter; all matter is made of particles, particles are in constant motion, particles of different substances are different, there are spaces between particles, and there are forces between particles. (6.2.1.1.1)• Students will be able to know what a physical change is; including phase/shape/size changes. (6.2.1.2.1)• Students will understand what dissolving is. (6.2.1.2.1)• Students will understand what a closed system is. (8.2.1.2.3)• Students will understand that mass is conserved as substances undergo physical changes. (8.2.1.2.3)• Students will list properties of an acid (sour taste, color changes with litmus, react with bases). (8.2.1.2.4)• Students will recognize common household materials that are acids and bases (vinegar, fruit juice, antacids, baking soda solution, etc.). (8.2.1.2.4)• Students will describe the organization of the periodic table according to element properties. (7.2.1.1.1)• Students will know that there are approx. 100 elements. (7.2.1.1.1)• Students will understand that all substances on Earth are composed of one or more elements. (7.2.1.1.1)• Students will explain electrical and thermal conductivity. (8.2.1.1.2)• Students will list evidence of a chemical change (ex. color change, gas produced, solid formation, temperature change [can use Vernier temperature probes]) (8.2.1.2.1)• Students will understand that more than one piece of evidence is necessary to identify a chemical change. (8.2.1.2.1)• Students will need to know how to operate common scientific instruments including; balances (electronic balances), metric rulers, graduated cylinders, Celsius thermometers, Vernier probes, and computers. (8.1.3.4.2)• Students will know what the appropriate lab safety procedures are. (8.1.3.4.2)• Students will know the basic procedures to carry out a controlled experiment.	<ul style="list-style-type: none">(7.2.1.1.2)• Students will be able to explain the components of a chemical equation. (7.2.1.1.3)• Students will be able to explain how the new substance is different from the original substance. (7.2.1.1.3)• Students will explain how physical properties can be used to identify unknown substances. (8.2.1.1.1)• Students will distinguish between a metal and non-metal using physical properties (ex. conductivity or magnetism) (8.2.1.1.2)• Students will compare and contrast chemical and physical changes. (8.2.1.2.1)• Students will distinguish between a closed/open system. (8.2.1.2.3)• Students will be able to carry out measurements using scientific tools. (8.1.3.4.2)• Students will analyze an element from the Periodic Table, in terms of atomic mass, proton, neutrons, and electrons. (7.2.1.1.1) <p>Skills - Students will:</p> <ul style="list-style-type: none">• Students will be able to carry out measurements using scientific tools. (6.1.3.4.1)·• Students will measure the densities of different substances. (6.2.1.1.1)• Students will use physical properties to separate mixtures and identify pure substances. (8.2.1.1.1)• Students will measure how mass stays constant in a closed reaction. (8.2.1.2.3)• Students will use Vernier probes to record temperature. (8.1.3.4.2)• Students will research information about an Element from the Periodic Table. (7.2.1.1.1)• Students will demonstrate the Law of Conservation of Mass. (8.2.1.2.3)• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables (STEM project).• Students will conduct an experimental research project and present this in a STEM fair setting.• Students will explain the properties of an element from the Periodic Table; including atomic mass, proton, neutron, electron.
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Common Misunderstandings <ul style="list-style-type: none">• Gases have no mass• Mass and volume are the same property• Volume cannot be measured for some objects because they are irregularly shaped• The density of two samples of the same substance with different volumes or shapes cannot be the same• A heavier object is always more dense.• When things dissolve, they disappear	Essential NEW vocabulary <table><tr><td><ul style="list-style-type: none">• Density• Displacement method• Melting point• Boiling point• Freezing point• Physical change• Physical property• Conservation of mass• Open system• Closed system• Dissolving</td><td><ul style="list-style-type: none">• Chemical change• Chemical property• Chemical reaction• Chemical equation• Reactant• Product• Solubility• Pure substance• Mixture• Compounds• Element</td><td><ul style="list-style-type: none">• Periodic Table of Elements• Dmitri Mendeleev• Atomic mass• Neutron• Proton• Electron• Acids• Bases• Metals• Nonmetals• Conductivity</td></tr></table>	<ul style="list-style-type: none">• Density• Displacement method• Melting point• Boiling point• Freezing point• Physical change• Physical property• Conservation of mass• Open system• Closed system• Dissolving	<ul style="list-style-type: none">• Chemical change• Chemical property• Chemical reaction• Chemical equation• Reactant• Product• Solubility• Pure substance• Mixture• Compounds• Element	<ul style="list-style-type: none">• Periodic Table of Elements• Dmitri Mendeleev• Atomic mass• Neutron• Proton• Electron• Acids• Bases• Metals• Nonmetals• Conductivity
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