

Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Science 8 (Earth Science)	Unit 1 Title:	Matter and Measurement	Grade Level(s):	8
Assessed Trimester:	Trimester 1	Pacing:	7-10 weeks	Date Created:	6/11/2012	Last Revision Date:	6/23/2014

Course Understandings: *Students will understand that:*

- 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: 8.1.3.4.2 (6.1.3.4.1 - same benchmark): Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context (Review-check understanding) 6.2.1.2.3: Use the relationship between heat and the motion and arrangement of particles in solids, liquids, and gases to explain melting, freezing, boiling, and evaporation. (Review-check understanding) 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. (Review-check understanding) 8.2.1.2.2: Distinguish between chemical and physical changes in matter. 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. 6.2.1.1.1: Explain density, dissolving, compression, diffusion, and thermal expansion using the particle model of matter. (Review-check understanding) 6.2.1.2.1: Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials. (Review-check understanding) 6.2.2.2.4: Distinguish between mass and weight. (Review-check understanding) 7.2.1.1.2: Describe the differences between elements and compounds, in terms of atoms and molecules. 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). (Review-check understanding) 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. 8.2.1.1.2: Use physical properties to distinguish between metals and non-metals. 8.2.1.2.1: Identify evidence of chemical changes, including color change, generation of a gas, solid formation, and temperature change. 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. Literacy Benchmark: 6.13.3.3: Follow precisely a multistep procedure when carrying out experiments, designing solutions, taking measurements, or performing technical tasks. 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>. 6.13.5.5: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic. 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).
Transfer
Students will be able to independently use their learning to: (product, high order reasoning) • Analyze how physical and chemical changes affect us in everyday life. • Use their knowledge of the scientific process to answer testable questions. • Collect and analyze data to draw scientific conclusions.

- Model complex ideas and systems. - Science is a dynamic field and that with new technology comes new information, with new information comes change in understanding.	
Meaning	
Unit Understanding(s): Students will understand that: - An atom is the basic unit of matter and use that to explain that everything in the universe is composed of matter and energy. - Physical and chemical properties can be used to organize and classify matter. - All the matter in the universe is characterized in the Periodic Table of the Elements, which can help us understand the properties of an element. - Interactions between atoms cause chemical changes that produce new substances with different chemical properties. - Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	Essential Question(s): Students will keep considering: - How are matter and energy similar and how are they different? - How is the Periodic Table of the Elements used to help us understand matter? - Why do physical and chemical changes affect matter? - How do physical and chemical changes affect matter differently?
Acquisition	
Knowledge - Students will: - Students will need to know how to operate common scientific instruments including; 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 be able to calculate density. (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 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, 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)	Reasoning - Students will: - Students will be able to analyze and interpret graphs and data. (8.1.3.4.2) - Students will compare the densities of different substances. (6.2.1.1.1) - Students will predict the effect on mass of a physical change in a closed system. (8.2.1.2.3) - Students will distinguish between elements and compounds in terms of atoms and molecules. (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 be able to analyze and interpret graphs and data. (8.1.3.4.2) Skills - Students will: - Students will be able to carry out measurements using scientific tools. (6.1.3.4.1) - Students will measure how mass stays constant in a closed reaction. (8.2.1.2.3) - 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)

Common Misunderstandings • 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 denser • When things dissolve, they disappear	Essential new vocabulary • Displacement method • Closed system • Open system • Melting point • Boiling point • Freezing point • Physical change • Conservation of mass (closed/open system) • Chemical change • Chemical property • Chemical reaction • Chemical equation • Reactant • Product • Solubility • Pure substance • Mixture • Compounds • Elements • Periodic Table of Elements • Acids • Bases • Metals • Nonmetals • Conductivity
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