Science
Unit 1: Atoms and Elements

Essential Understandings	▪ All matter is composed of atoms, which are far too small to see through a microscope. ▪ All matter is composed of atoms of elements found on the periodic table. ▪ Atoms of any element are alike, but different from atoms of other elements. ▪ There are groups of elements that have similar properties. ▪ Different arrangements of atoms compose all substances and determine the state of matter.
Essential Questions	▪ What is matter? ▪ How does matter change its state? ▪ How have models of the atom changed over time? ▪ Why have models of the atom changed over time? ▪ What is an element? ▪ What is the periodic table and how is it used? ▪ What are some common misconceptions about matter?
Essential Knowledge	▪ Atoms are composed of smaller, sub-atomic particles (e.g. neutrons, protons, and electrons). ▪ States of matter depend upon movement of atoms. ▪ Different models of the atom have been proposed through the years, as new information is discovered. ▪ The periodic table has undergone numerous changes as new discoveries have been made. ▪ The periodic table is arranged in order of increasing atomic number and arranged in periods and groups/families. ▪ Periods are based on increasing electron energy levels. ▪ Groups/families share common properties.
Vocabulary	▪ <u>Terms</u>: ○ electron, proton, neutron, periodic table, element, group, family, period, matter, atom, solid, liquid, gas, and plasma
Essential Skills	▪ Compare and contrast different historical models of the atom. ▪ Use proportions, averages, and range to describe small and large extremes of scale. ▪ Find an element on the periodic table and explain its location in terms of properties and common characteristics. ▪ Use clues to accurately place elements in their proper place on the periodic table (e.g. atomic number, reactivity, mass). ▪ Draw a two-dimensional model of an atom showing relative locations of subatomic particles. ▪ Accurately observe, record, and explain interactions with matter.

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Related Maine Learning Results	Science A. Unifying Themes A2.Models Students use models to examine a variety of real-world phenomena form the physical setting, the living environment, and the technological world and compare advantages and disadvantages of various models. a. Compare different types of models that can be used to represent the same thing (including models of chemical reactions, motion, or cells, in order to match the purpose and complexity of a model of its use. A4.Scale Students use scale to describe objects, phenomena, or processes related to Earth, space, matter, and mechanical and living systems. b. Use proportions, averages, and ranges to describe small and large extremes of scale. C. The Scientific and Technological Enterprise C2.Understandings About Science and Technology Students understand and compare the similarities and differences between scientific inquiry and technological design. a. Compare the process of scientific inquiry to the process of technological design. b. Explain how constraints and consequences impact scientific inquiry and technological design. C4.History and Nature of Science Students describe historical examples that illustrate how science advances knowledge through the scientists involved and through the ways scientists think about their work and the work of others. a. Describe how women and men of various backgrounds, working in teams or alone and communicating about their ideas extensively with others, engage in science, engineering and related fields. b. Describe a breakthrough from the history of science that contributes to our current understanding of science. c. Describe and provide examples that illustrate that science is a human endeavor that generates explanations based on verifiable evidence that are subject to changes when new evidence does not match existing explanations.

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Related Maine Learning Results	D. The Physical Setting D3.Matter and Energy Students describe physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter. a. Describe that all matter is made up of atoms and distinguish between/among elements, atoms, and molecules. b. Describe how physical characteristics of elements and types of reactions they undergo have been used to create the Periodic Table. d. Explain the relationship of the motion of atoms and molecules to the states of matter for gases, liquids, and solids. e. Explain how atoms are packed together in arrangements that compose all substances including elements, compounds, mixtures, and solutions.
Sample Lessons And Activities	▪ Research elements. ▪ Determine similar characteristics among elements of the same family. ▪ Determine misconceptions about matter. ▪ Use clues to identify where an element is placed on the periodic table.
Sample Classroom Assessment Methods	▪ What is Matter? Probe ▪ Group/Family Work ▪ Periodic Table Clues ▪ Wet Jeans Probe ▪ Symbol/Element Name Quizzes ▪ Alien Periodic Table (Common Assessment)
Sample Resources	▪ Publications: ○ ScienceSaurus ○ Periodic Table of the Elements ○ http://www.chem4kids.com/files/atom_intro.html ○ http://education.jlab.org/itselemental/index.html ○ http://www.kidskonnect.com/subject-index/15-science/60-atoms.html ▪ Videos: ○ Chemistry DVDs and VHS tapes from BJHS Library