

**Maine Science and Technology Grades 9-12
Contents Standards Mapping**

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The Physical Setting	Boardworks High School Chemistry Presentations
D3 Matter and Energy - Students describe the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy.	
a. Describe the structure of atoms in terms of neutrons, protons, and electrons and the role of the atomic structure in determining chemical properties.	Atomic Structure Electron Structure and The Periodic Table
b. Describe how the number and arrangement of atoms in a molecule determine a molecule's properties, including the types of bonds it makes with other molecules and its mass, and apply this to predictions about chemical reactions.	Covalent Bonding Electronegativity Ionic Bonding Ionization Energy Patterns of Behavior Why do Atoms Bond?
<i>c. Explain the essential roles of carbon and water in life processes.</i>	-
d. Describe how light is emitted and absorbed by atoms' changing energy levels, and how the results can be used to identify a substance.	Observing Line Spectra
e. Describe factors that affect the rate of chemical reactions (including concentration, pressure, temperature, and the presence of molecules that encourage interaction with other molecules).	Concentration, Pressure and Reaction Rates Rates of Reactions Surface Area, Catalysts and Reaction Rates Temperature and Reacton Rates
f. Apply an understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical reactions.	Concentration, Pressure and Reaction Rates Rates of Reactions Surface Area, Catalysts and Reaction Rates Temperature and Reacton Rates
g. Describe nuclear reactions, including fusion and fission, and the energy they release.	Nuclear Fission Nuclear Fusion
h. Describe radioactive decay and half-life.	Half-Life Radioactive Dating Radioactivity
<i>i. Explain the relationship between kinetic and potential energy and apply the knowledge to solve problems</i>	-

j. Describe how in energy transformations the total amount of energy remains the same, but because of inefficiencies (heat, sound, and vibration) useful energy is often lost through radiation or conduction.	Energy Transfers
k. Apply an understanding of energy transformations to solve problems.	Energy Transfers
l. Describe the relationship among heat, temperature, and pressure in terms of the actions of atoms, molecules, and ions.	Changing State Particles in Action
D4 Force and Motion - Students understand that the laws of force and motion are the same across the universe.	
<i>a. Describe the contribution of Newton to our understanding of force and motion, and give examples of and apply Newton's three laws of motion and his theory of gravitation.</i>	See Boardworks High School Physics for relevant presentations.
<i>b. Explain and apply the ideas of relative motion and frame of reference.</i>	
<i>c. Describe the relationship between electric and magnetic fields and forces, and give examples of how this relationship is used in modern technologies.</i>	
<i>d. Describe and apply characteristics of waves including wavelength, frequency, and amplitude.</i>	
<i>e. Describe and apply an understanding of how waves interact with other waves and with materials including reflection, refraction, and absorption.</i>	
<i>f. Describe kinetic energy (the energy of motion), potential energy (dependent on relative position), and energy contained by a field (including electromagnetic waves) and apply these understandings to energy problems.</i>	