

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

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The Physical Setting	Boardworks High School Physics 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.	Structure of the Atom
<i>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.</i>	See Boardworks High School Chemistry for relevant presentations.
<i>c. Explain the essential roles of carbon and water in life processes.</i>	
<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.</i>	
<i>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).</i>	
<i>f. Apply an understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical reactions.</i>	
g. Describe nuclear reactions, including fusion and fission, and the energy they release.	Nuclear Fission Nuclear Fusion
h. Describe radioactive decay and half-life.	Radioactive Dating Radioactivity
i. Explain the relationship between kinetic and potential energy and apply the knowledge to solve problems	Gravitational and Potential Energy Kinetic Energy
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.	Conduction and Convection Energy Transfers Radiation
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.	

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.	Newton's First Law Newton's Second Law Newton's Third Law
<i>b. Explain and apply the ideas of relative motion and frame of reference.</i>	–
c. Describe the relationship between electric and magnetic fields and forces, and give examples of how this relationship is used in modern technologies.	Magnetism, Current and Force
d. Describe and apply characteristics of waves including wavelength, frequency, and amplitude.	Longitudinal Waves Sound Transverse Waves Waves
e. Describe and apply an understanding of how waves interact with other waves and with materials including reflection, refraction, and absorption.	Diffraction Reflection Refraction Refractive Index
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.	Kinetic Energy Gravitational and Potential Energy Magnetism, Current and Force