Science

## Brunswick School Department Grade 9 Energy

	<ul> <li>Causation: Nothing "just happens". Everything is caused</li> </ul>
Essential	Interrelatedness: Everything in the universe is connected to
Understandings	everything else in the universe.
g_	<ul> <li>Dynamism: Everything is changing in some way all the time.</li> </ul>
	<ul> <li>Entropy: Change has direction. Generally simple precedes</li> </ul>
	complex Generally order changes toward disorder
	<ul> <li>Uniformitarianism: The way the universe works today is the way it</li> </ul>
	worked vesterday and the way it will work tomorrow
	<ul> <li>What is energy?</li> </ul>
Fssontial	■ How are work and energy related?
Questions	<ul> <li>How is energy conserved?</li> </ul>
Questions	<ul> <li>What factors determine the amount of thermal energy in an object?</li> </ul>
	<ul> <li>Energy can be neither created nor destroyed but can be changed</li> </ul>
Essontial	from one form to another
Knowledge	<ul> <li>Work is a transfer of energy through motion</li> </ul>
Kilowieuge	<ul> <li>Simple machines transfer energy/work</li> </ul>
	<ul> <li>Compound machines are two or more simple machines combined</li> </ul>
	<ul> <li>Efficiency is work out divided by work in</li> </ul>
	<ul> <li>All objects have thermal energy</li> </ul>
	<ul> <li>All objects have thermal energy.</li> <li>Different objects absorb/release different amounts of energy.</li> </ul>
	<ul> <li>Different objects absorb/release different amounts of energy.</li> <li>Desitive heat values represent heat gained and negative heat</li> </ul>
	<ul> <li>Positive neat values represent heat gamed and negative neat values represent heat lost</li> </ul>
Veeebulen	
vocabulary	
	• WUIK
	o potential energy
	• Kinetic energy
	• mechanical energy
	o inernal energy
	o fiedi
	o mechanical advantage
	• eniciency
Feential	• Use appropriate formulas to calculate work and energy relationships $(M = Ed + E = math + E = 1/mx^2)$
Essential	relationships ( $VV = FU$ , $E_P = High$ , $E_K = \frac{1}{2}(HV)$
SKIIIS	• Determine the thermal energy of an object using $E_T = Q = m \Delta T C$
	<ul> <li>Determine both positive and negative neat values based upon information provided</li> </ul>
	Information provided.
Dalated	Calculate mechanical advantages of simple machines
Kelated	BI Skills and Traits of Scientific Inquiry
Maine Learning	
Results	Students methodically plan, conduct, analyze data from, and

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communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.
a. Identify questions, concepts, and testable hypotheses that guide scientific investigations.
b. Design and safely conduct methodical scientific investigations, including experiments with controls.
results.
logic and evidence.
using scientific criteria.
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D2 Earth
Students describe and analyze the biological, physical, energy, and human influences that shape and alter Earth Systems.
<ul> <li>a. Describe and analyze the effect of solar radiation, ocean currents, and atmospheric conditions on the Earth's surface.</li> <li>b. Describe Earth's internal energy sources and their role in plate tectonics.</li> </ul>
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
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. d. Describe how light is emitted and absorbed by atoms' changing energy levels, and how the results can be used to identify a substance.
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).

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	<ul> <li>f. Apply an understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical reactions.</li> <li>g. Describe nuclear reactions, including fusion and fission, and the energy they release.</li> <li>h. Describe radioactive decay and half-life.</li> </ul>
	<ul> <li>i. Explain the relationship between kinetic and potential energy and apply knowledge to solve problems.</li> <li>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.</li> <li>k. Apply an understanding of energy transformations to solve problems.</li> </ul>
	<ol> <li>Describe the relationship among heat, temperature, and pressure in terms of the actions of atoms, molecules and ions.</li> </ol>
	D4 Force and Motion
	Students understand that the laws of force and motion are the same across the universe.
	<ul> <li>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</li> <li>b. Explain and apply the ideas of relative motion and frame of reference.</li> </ul>
	<ul> <li>c. Describe the relationship between electric and magnetic fields and forces, and give examples of how this relationship is used in modern technologies.</li> <li>d. Describe and apply characteristics of waves, including</li> </ul>
	wavelength, frequency, and amplitude. e. Describe and apply an understanding of how waves interact with other waves and with materials including reflection, refraction and absorption.
	(dependent on relative position), and energy contained by a field (including electromagnetic waves) and apply these understandings to energy problems.
Sample Lessons And Activities	<ul> <li>Coke Can/Calorimeter Laboratory</li> <li>Work and Power Stair Laboratory</li> <li>Rubber band (Elastic Potential Energy) Laboratory</li> <li>Specific Heat / Paraffin Wax Demonstration</li> <li>Develop a "Rube Goldberg" machine, calculating total mechanical advantage</li> </ul>
Activities	<ul> <li>Specific Heat / Paraffin Wax Demonstration</li> <li>Develop a "Rube Goldberg" machine, calculating total mechanical advantage</li> </ul>

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Sample	Chapter Tests
Classroom	<ul> <li>Energy Quizzes</li> </ul>
Assessment	<ul> <li>Laboratory Reports</li> </ul>
Methods	Lectures
	<ul> <li>Demonstrations</li> </ul>
	<ul> <li>Laboratory exercises</li> </ul>
	Sharing circles
	Publications:
Sample	<ul> <li>Glencoe Physical Science</li> </ul>
Resources	<ul> <li>MARVEL Data bases *</li> </ul>
	<ul> <li>GALE Resource Data bases **</li> </ul>
	Videos:
	<ul> <li>The Mechanical Universe</li> </ul>
	<ul> <li>Connections Series</li> </ul>
	<ul> <li><u>ESPN Sports Figures</u></li> </ul>
Technology	http://www.brunswick.k12.me.us/curriculum
Link	* Data base may also be accessed from home
	http://www.maine.gov/marvel
	** Data base may also be accessed from home with logon and
	password http://infotrac.galegroup.com/itweb