

LITCHFIELD PUBLIC SCHOOLS
Core Curriculum Scope and Sequence
Integrated Physical Science/9th grade

Name of Unit Weeks	CT Frameworks/ Standards	Content and Skill Objectives Students will be able to:	Assessments	Resources
<p>Scientific Inquiry</p> <p>4 weeks</p>	<p>I. SCIENTIFIC INQUIRY</p> <ul style="list-style-type: none"> ◆ Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena. ◆ Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation. ◆ Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists. <p>II. SCIENTIFIC LITERACY</p> <ul style="list-style-type: none"> ◆ Scientific literacy includes the ability to read, write, 	<p>Identify questions that can be answered through scientific investigation.</p> <p>Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.</p> <p>Design and conduct appropriate types of scientific investigations to answer different questions.</p> <p>Identify independent and dependent variables, including those that are kept constant and those used as controls.</p> <p>Use appropriate tools and techniques to make observations and gather data.</p> <p>Assess the reliability of the data that was generated in the investigation.</p> <p>Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.</p> <p>Communicate about science in different</p>	<p>LABS</p> <p>“Graphing Camp” Data Analysis</p> <p>“Melt That Ice” Experimental Inquiry</p> <p>Test</p>	<p>Power Point notes – All units</p> <p>Special Ed – additional notes, modifications – all units</p> <p>Media specialist</p>

	<p>discuss and present coherent ideas about science.</p> <ul style="list-style-type: none"> Scientific literacy includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media. <p>III. SCIENTIFIC NUMERACY</p> <ul style="list-style-type: none"> Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas. 	<p>formats, using relevant science vocabulary, supporting evidence and clear logic.</p> <p>Read, interpret and examine the credibility and validity of scientific claims in different sources of information.</p> <p>Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.</p>		
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Introduction to Matter / Chemistry 5 weeks	<p>D1. Describe the effects of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes.</p> <p>9.4 Atoms react with one another to form new molecules.</p> <p>D10. Describe the general structure of the atom, and explain how the properties of the first 20 elements in the Periodic Table are related to their atomic structures.</p> <p>D11. Describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).</p> <p>D12. Explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions.</p>	<p>Describe the effects of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes.</p> <p>Describe the general structure of the atom, and explain how the properties of the first 20 elements in the Periodic Table are related to their atomic structures.</p> <p><i>Differentiation: Describe electron configurations in terms of orbitals and hybridization.</i></p> <p>Describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).</p> <p><i>Differentiation: Describe the property of electronegativity and explain its effect on electron distribution in molecules.</i></p> <p>Describe metallic bonding and its effect on the properties of metals.</p> <p>Explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions.</p>	<p>LABS “Archimedes’ Canoe” Density Investigation Graph phase changes of naphthalene Sublimation of Dry Ice Diameter vs. Capillary Rise Phase change lab – water/ice; lauric acid CuCl + Al chemical reaction</p> <p>Water vs. Buffer effect on the change in pH</p> <p>Test</p> <p>Obscertainer Kit Inquiry Lab</p> <p>Lab: Classify elements: metal, nonmetal, or metalloid</p> <p>Lab: candle composition by indirect observation</p> <p>Mapping atoms – the Rutherford model</p> <p>Create a Periodic Table</p>	<p>Text: Physical Science: Concepts in Action Wysession, Frank, and Yancopoulos Prentice Hall, 2006</p> <p>Web based Videos</p> <p>Molecular Model Kits</p> <p>Released CAPT questions</p>

		<p><i>Differentiation: Describe pH in terms of hydronium and hydroxide ion concentrations and explain the pH scale demonstrating an understanding of inverse logarithms.</i></p> <p>Describe the process of ionization, neutralization and buffering in terms of equilibrium.</p>	Lab: Defining a Metal	
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<p>Carbon (Organic) Chemistry</p> <p>10 weeks</p>	<p>9.5 Due to its unique chemical structure, carbon forms many organic and inorganic compounds.</p> <p>D13. Explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.</p> <p>D14. Describe combustion reactions of hydrocarbons and their resulting by-products.</p> <p>D 15. Explain the general formation and structure of carbon-based polymers, including synthetic polymers, such as polyethylene, and biopolymers, such as carbohydrate.</p> <p>9.6 Chemical technologies present both risks and benefits to the health and well-being of</p>	<p>Explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.</p> <p>Demonstrate clear understanding of substituted hydrocarbons and <i>Differentiation: differentiate between functional groups.</i></p> <p>Graphically analyze historic uses of the major fossil fuels and other energy sources in Connecticut.</p> <p>Explain the general formation and structure of carbon-based polymers, including synthetic polymers, such as polyethylene and polyvinylchloride, & biopolymers, such as carbohydrate and protein.</p> <p><i>Differentiation: Describe differences in properties of synthetic polymers based on their structures.</i></p> <p>Describe carbohydrates, lipids, proteins and nucleic acids in terms of their structure and bonding of functional groups.</p>	<p>LABS</p> <p>Natural polymer model building</p> <p>Models of hydrocarbons – single, double and triple bonds</p> <p>Build models of linear, branched, and ring structures. Draw structural formulas and molecular formulas.</p> <p>Make a model of hexane. Draw the structural formula on a piece of paper.</p> <p>Make models of all the isomers of hexane and draw their structural formulas.</p> <p>Interpret a graph of a property of hydrocarbons. Identify the trend of the graph and predict the value for an unknown compound.</p> <p>Models of hydrocarbons –</p>	<p>Molecular Model Kit</p>

	<p>humans, plants and animals.</p> <p>D16. Explain how simple chemical monomers can be combined to create linear, branched and/or cross-linked polymers.</p> <p>D17. Explain how the chemical structure of polymers affects their physical properties.</p>		<p>linear, branched and ring forms</p> <p>Graphing Skills Assessment: Energy Use in CT</p> <p>Graphing Skills Assessment: World Energy Use</p> <p>Size of Alcohol Molecule vs. Amount of Heat</p> <p>Investigating the puncture & tensile strength of various polymers</p> <p>Polymer poster project</p> <p>Organic Nomenclature worksheet</p> <p>Lab: Test for carbohydrates and starch</p> <p>Test</p>	
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<p>Energy Transformations</p> <p>3 weeks</p>	<p>9.1 Energy cannot be created or destroyed; however, energy can be converted from one form to another.</p> <p>D2. Explain how energy is transferred by conduction, convection and radiation.</p> <p>D3. Describe energy transformations among heat, light, electricity and motion.</p>	<p>Distinguish between kinetic and potential energy.</p> <p>Apply second law of thermodynamics to any energy transformation.</p> <p>Explain the gas laws in terms of the kinetic theory.</p> <p><i>Differentiation: Solve problems using Boyle's Law, Charles' Law, the relationship between temperature and pressure, and the combined gas law.</i></p> <p><i>Differentiation: Relate radiational energy transfers, heat and temperature quantitatively to the electromagnetic spectrum.</i></p>	<p>LABS Ball drop and Bungee Cords : Hooke's Law</p> <p>Water, Soil or Air (or Can Color:) Comparing heat absorption</p> <p>Test</p>	<p>Einstein video Einstein's Big Idea: $E = mc^2$</p>

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Name of Unit Weeks	CT Frameworks/ Standards	Content and Skill Objectives Students will be able to:	Assessments	Resources
<p>Electricity & Magnetism</p> <p>7 weeks</p>	<p>9.2 The electrical force is a universal force that exists between any two charged objects.</p> <p>D4. Explain the relationship among voltage, current and resistance in a simple series circuit.</p> <p>D5. Explain how electricity is used to produce heat and light in incandescent bulbs and heating elements.</p> <p>D6. Describe the relationship between current and magnetism</p> <p>9.3 Various sources of energy are used by humans and all have advantages and disadvantages.</p> <p>D7. Explain how heat is used to generate electricity.</p> <p>D8. Describe the availability, current uses and environmental issues related to the use of fossil and nuclear fuels to produce electricity.</p> <p>D9. Describe the availability, current uses and environmental</p>	<p>Distinguish between kinetic and potential energy.</p> <p>Apply second law of thermodynamics to any energy transformation.</p> <p>Explain the gas laws in terms of the kinetic theory.</p> <p><i>Differentiation: Solve problems using Boyle's Law, Charles' Law, the relationship between temperature and pressure, and the combined gas law.</i></p> <p><i>Differentiation: Relate radiational energy transfers, heat and temperature quantitatively to the electromagnetic spectrum.</i></p> <p>Relate energy transformations to properties of substances and molecular attractions, including hydrogen bonding.</p> <p>Describe the relationship between current and magnetism.</p> <p><i>Differentiation: Explain the physics of electromagnetic induction.</i></p>	<p>Lab: Build an Electromagnet</p> <p>LABS Build simple series and parallel circuits</p> <p>Build a simple motor (or dissect a simple appliance) and describe how electricity is transformed into mechanical (or thermal) energy.</p> <p>Test</p>	<p>Edison video</p>

	<p>issues related to the use of hydrogen fuel cells, wind and solar energy to produce electricity.</p>	<p>Explain how electrical transformers work.</p> <p>Explain the relationship among voltage, current and resistance in a simple series circuit.</p> <p>Perform calculations for series, parallel and <i>Differentiation combined circuits</i>.</p> <p>Explain how electricity is used to produce heat and light in incandescent bulbs and heating elements.</p> <p>Describe energy transformations among heat, light, electricity and motion.</p> <p>Explain how electromagnets are used to transform electrical energy into mechanical energy in a motor.</p> <p>Analyze the application of energy transformations of a home appliance or industrial process.</p> <p>Compare efficiencies of different types of energy transfers.</p>		
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Name of Unit Weeks	CT Frameworks/ Standards	Content and Skill Objectives Students will be able to:	Assessments	Resources
<p style="text-align: center;">Human Impacts of Natural cycles</p> <p style="text-align: center;">10 weeks</p>	<p>D9. Explain the short- and long-term impacts of landfills and incineration of waste materials on the quality of the environment.</p> <p>9.8 The use of resources by human populations may affect the quality of the environment.</p> <p>D 19. Explain how chemical and physical processes cause carbon to cycle through the major earth reservoirs.</p> <p>D22. Explain how the release of sulfur dioxide (SO₂) into the atmosphere can form acid rain, and how acid rain affects water sources, organisms and human-made structures.</p> <p>D24. Explain how the accumulation of carbon dioxide (CO₂) in the atmosphere increases Earth’s “greenhouse” effect and may cause climate changes.</p>	<p>Explain in detail how carbon is trapped, released, and sequestered in the environment.</p> <p>Explain how the accumulation of carbon dioxide (CO₂) in the atmosphere increases Earth’s “greenhouse” effect and may cause climate changes.</p> <p>Describe the geologic formation of the three major fossil fuels.</p> <p>Explain the greenhouse effect in terms of absorbance, reflectance and re-radiation.</p> <p>Describe the relative role of all greenhouse gases and explain their origin.</p> <p>Describe production of carbon and nitrogen compounds and other oxides resulting from combustion of impurities in fuels.</p> <p>Explain how the release of sulfur dioxide (SO₂) into the atmosphere can form acid rain, and how acid rain affects water sources, organisms and human-made structures.</p>	<p>LABS Build a Solar Cooker</p> <p>Investigate a Simulated Brownfield</p> <p>How will acidic solutions affect the chemical weathering of various rocks?</p> <p>How will pH changes affect the cycling of nitrogen?</p> <p>How does temperature affect dissolved oxygen?</p> <p>Test</p> <p>Acid Rain Lab</p>	

	<p>D24. Explain how the accumulation of mercury, phosphates and nitrates affects the quality of water and the organisms that live in rivers, lakes and oceans.</p> <p>9.9 Some materials can be recycled, but others accumulate in the environment and may affect the balance of the Earth systems.</p> <p>D25. Explain how land development, transportation options and consumption of resources may affect the environment.</p> <p>D26. Describe human efforts to reduce the consumption of raw materials and improve air and water quality.</p> <p>9.7 Elements on Earth move among reservoirs in the solid earth, oceans, atmosphere and organisms as part of biogeochemical cycles.</p> <p>D20. Explain how solar energy causes water to cycle through the major earth reservoirs.</p> <p>D21. Explain how internal energy of the Earth causes</p>	<p>Explain the origin of sulfur and nitrogen in fuels.</p> <p>Describe the formation of sulfur and nitrogen compounds in the air and the process of dry deposition.</p> <p>Explain the specific chemical changes caused by acid rain in water, organisms and human made structures.</p> <p>Explain how solar energy causes water to cycle through the major earth reservoirs.</p> <p>Explain how the accumulation of mercury, phosphates and nitrates affects the quality of water and the organisms that live in rivers, lakes and oceans.</p> <p>Describe the chemical changes that mercury undergoes in the environment that increase its toxicity.</p> <p>Describe the process of eutrophication.</p> <p>Describe waste water treatment processes from primary to tertiary.</p> <p>Explain the short- and long-term impacts of landfills and incineration of waste materials on the quality of the environment.</p> <p>Describe the effects of leaching and acidification on the environment.</p> <p>Describe the production of methane from waste degradation and incineration.</p>		
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	matter to cycle through the magma and the solid earth.	<p>Research and describe the trash to energy process in the Connecticut Resource Recovery system, including process conditions to prevent toxic by-products.</p> <p>Explain how biological and physical processes cause carbon, nitrogen and oxygen to cycle through the major earth reservoirs.</p>		
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