

**Southington Public Schools  
Curriculum Map**

**Subject:** Science

**Grade:** 8

UNIT TITLE	#1 Elements / Compounds/Mixtures	#2 Design of Structures	#3 Electrical Energy	#4 Forces and Motion	#5 Chemical Structures & Properties	#6 Energy, Work, Simple Machines
<b>CONTENT</b>	<ul style="list-style-type: none"> <li>Composition, properties of materials: - Elements, compounds, mixtures</li> <li>Classification based on physical / chemical properties</li> </ul>	<ul style="list-style-type: none"> <li>Bridge Design &amp; Function</li> <li>Beam, Truss, Suspension</li> <li>Factors: Force, Materials, Safety</li> </ul>	<p>Electrical Force:</p> <ul style="list-style-type: none"> <li>Current, voltage, resistance</li> <li>Motors and generators</li> </ul> <p>Produces light and heat</p>	<ul style="list-style-type: none"> <li>Speed, Distance, Time, Acceleration, Velocity</li> <li>Net Force, Momentum</li> <li>Gravity, Centripetal Force</li> </ul>	<ul style="list-style-type: none"> <li>Atomic Structure</li> <li>Periodic table of elements</li> <li>Bonding (ionic and covalent)</li> <li>New materials formed</li> </ul> <p>Acids, Bases, pH</p>	<ul style="list-style-type: none"> <li>Relationships with force, distance, work</li> <li>Simple machines</li> <li>Mechanical advantage</li> <li>Potential / kinetic energy</li> </ul>
<b>STATE STANDARDS</b>	<p>6.1 Materials can be classified as pure substances or mixtures, depending on their chemical and physical properties.</p> <ul style="list-style-type: none"> <li>Mixtures are made of combinations of elements and/or compounds, and they can be separated by using a variety of physical means.</li> <li>Pure substances can be either elements or compounds, and they cannot be broken down by physical means.</li> </ul> <p>C1. Describe the properties of common elements, such as oxygen, hydrogen, carbon, iron and aluminum.</p>	<p>8.4 – In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.</p> <ul style="list-style-type: none"> <li>Bridges can be designed in different ways to withstand certain loads and potentially destructive forces.</li> </ul> <p>C 30. Explain how beam, truss and suspension bridges are designed to withstand the forces that act on them.</p> <p>C INQ.1 Identify questions that can be answered through scientific investigation</p>	<p>9.2 The electrical force is a universal force that exists between any two charged objects.</p> <ul style="list-style-type: none"> <li>Moving electrical charges produce magnetic forces, and moving magnets can produce electrical force.</li> <li>Electrical current can be transformed into light through the excitation of electrons.</li> </ul> <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>8.1 An object's inertia causes it to continue moving the way it is moving unless it is acted upon by a force to change its motion.</p> <ul style="list-style-type: none"> <li>The motion of an object can be described by its position, direction of motion and its speed.</li> <li>An unbalanced force acting on an object changes its speed or direction of motion or both.</li> <li>Objects moving in circles must experience force acting toward the center.</li> </ul> <p>C22. Calculate average speed of a moving object and illustrate the motion of objects in graphs of distance over time.</p>	<p>9.4 Atoms react with one another to form new molecules.</p> <ul style="list-style-type: none"> <li>Atoms have a positively charged nucleus surrounded by negatively charged electrons.</li> <li>The configuration of atoms and molecules determines the properties of the materials.</li> </ul> <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>7.1 Energy provides the ability to do work and can exist in many forms.</p> <ul style="list-style-type: none"> <li>Work is the process of making objects move through the application of force.</li> <li>Energy can be stored in many forms and can be transformed into the energy of motion.</li> </ul> <p>C12. Explain the relationship among force, distance and work, and use the relationship (<math>W = F \times D</math>) to calculate work done in lifting heavy objects.</p> <p>C13. Explain how simple machines, such as inclined planes, pulleys and levers, are used to create mechanical advantage.</p>

<p><b>STATE STANDARDS</b></p>	<p>C2. Describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.  C3. Explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.  C INQ.1 Identify questions that can be answered through scientific investigation  C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.6 Use mathematical operations to analyze and interpret data.  C INQ.8 Draw conclusions and identify sources of error.</p>	<p>C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.8 Draw conclusions and identify sources of error.  C INQ.9 Provide explanations to investigate problems or questions.  C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>	<p>D6. Describe the relationship between current and magnetism.  C INQ.1 Identify questions that can be answered through scientific investigation  C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.6 Use mathematical operations to analyze and interpret data.  C INQ.7 Identify and present relationships between variables in appropriate graphs.  C INQ.8 Draw conclusions and identify sources of error.  C INQ.9 Provide explanations to investigate problems or questions.</p>	<p>C23. Describe the qualitative relationships among force, mass, and changes in motion.  C24. Describe the forces acting on an object moving in a circular path.  C28. Explain the effect of gravity on the orbital movement of planets in the solar system.  C INQ.1 Identify questions that can be answered through scientific investigation  C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.6 Use mathematical operations to analyze and interpret data.  C INQ.7 Identify and present relationships between variables in appropriate graphs.  C INQ.8 Draw conclusions and identify sources of error.  C INQ.9 Provide explanations to investigate problems</p>	<p>D11. Describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).  D12. Explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions.  C INQ.1 Identify questions that can be answered through scientific investigation  C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.8 Draw conclusions and identify sources of error.  C INQ.9 Provide explanations to investigate problems or questions.</p>	<p>C14. Describe how different types of stored (potential) energy can be used to make objects move.  C INQ.1 Identify questions that can be answered through scientific investigation  C INQ.3 Design and conduct appropriate types of scientific investigations to answer different questions  C INQ.5 Use appropriate tools and techniques to make observations and gather data  C INQ.6 Use mathematical operations to analyze and interpret data.  C INQ.8 Draw conclusions and identify sources of error.  C INQ.9 Provide explanations to investigate problems or questions.  C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>
<p><b>STATE</b></p>						

<b>STANDARDS</b>	<p>C INQ.9 Provide explanations to investigate problems or questions. C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>		<p>C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>	<p>or questions. C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>	<p>C INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.</p>	
<b>ASSESSMENT</b>	<p><b><u>PERFORMANCE TASK</u></b> You are a chemist and have been assigned to identify the components of an unknown substance. This will be a mixture of four substances. You will need to design an experimental procedure to separate the components of this mixture. Use your knowledge of physical and chemical properties to determine which tests to use.  Perform your experiments and identify the four substances. In your final report, identify the specific property and the test used to determine each substance.</p>	<p><b><u>PERFORMANCE TASK</u></b> Bridge Project – Design, Build, Evaluate, and Reflect <i>The students, acting as a local civil engineering firm, will design, propose and build a scale model bridge that meets the projects specifications and design constraints.</i>  Bridge Design: 1. Bridge Design Brief 2. Building Instructions 3. Cost Estimate 4. Explanation of Forces 5. Load Test 6. Comparison to Beam Bridge 7. Destructive Forces Discussion</p>	<p><b><u>PERFORMANCE TASK</u></b> You are an inventor and want to design a simple motor that can be used to run small devices. You will construct an electric motor using the following materials:  D-cell pliers 2 large paper clips sandpaper Disc. magnet 2 insulated wires Clay enamel-coated wire Film canister  When motor is complete, list 3 factors that may affect the motion of the coil. Design an experiment to test one of those factors. Share your experimental design and results with other amateur inventors.</p>	<p><b><u>PERFORMANCE TASK</u></b> CSDE Embedded Task: “Shipping and Sliding” Task #1: You are an engineer and have been hired to conduct a friction study that will explore ways to increase the friction force and solve the problem of the sliding television boxes on a ships’ cargo floor room.  First, you will design and conduct experiments to find how friction is affected by different box and floor materials. Next, you will identify and explore another variable that may also affect friction. Then, you will analyze your experimental findings to make recommendations to the television manufacturer or the shipping company.  You will explore which combinations of floor and box materials create more or less friction.</p>	<p><b><u>PERFORMANCE TASK</u></b> Element “CSI” – What is the unknown element? You are a chemist and will use your knowledge of the arrangement of the Periodic Table, chemical and physical properties, and properties of elements in order to determine the approximate location of the unknown element on the Periodic Table.  You will keep a log or journal of the steps taken in order to identify the unknown element. You should write not only the action(s), but also the results for each step of the identification process.</p>	<p><b><u>PERFORMANCE TASK</u></b> Students will be given examples of elaborate simple machines to do everyday tasks – such as used in the board game “Mouse Trap” or in Rube Goldberg cartoons. Students will then be given the assignment to design a “Rube Goldberg Machine” in order to complete a task of either their choice or as assigned by the teacher. The student should illustrate the series of simple machines used to complete the task as well as write an explanation of the simple machine components, energy, and work contained within their</p>

<p><b>ASSESSMENT</b></p>		<p>Bridge Design Reflection</p> <ol style="list-style-type: none"> <li>1. Compare and Contrast</li> <li>2. Proposed Design Improvements</li> </ol> <p>Writing</p> <ol style="list-style-type: none"> <li>1. Organization</li> <li>2. Constructs Meaning</li> <li>3. Grammar, Usage, Mechanics and Spelling</li> </ol>		<p>Prepare a record your experimental design, data collection and analysis.</p> <p>Task #2 Design and conduct an experiment to explore one of these factors: Effect of Mass or Surface Area on Friction Force. Prepare a record of your experimental design, data collection and analysis.</p> <p>Write a report to the TV manufacturer or the shipping company describing your research and recommendations for reducing the sliding of the shipping boxes.</p>	<p>The final evaluation will include not only how many components of the mixture were separated correctly, but also the log of the steps and application of laboratory procedures and knowledge of physical and chemical properties.</p>	<p>illustration.</p>
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ASSESSMENT	<u>OTHER EVIDENCE</u>	<u>OTHER EVIDENCE</u>	<u>OTHER EVIDENCE</u>	<u>OTHER EVIDENCE</u>	<u>OTHER EVIDENCE</u>	<u>OTHER EVIDENCE</u>
	<ul style="list-style-type: none"> <li>• Lab Reports</li> <li>• Activities</li> <li>• Elements Name/Symbols</li> <li>• Periodic Table of Elements Drawing</li> <li>• Classification of Matter Chart</li> <li>• Worksheets</li> <li>• Quizzes</li> <li>• Test</li> <li>• Drawings of Atomic Model</li> <li>• Models of simple atoms or molecules</li> <li>• Compare and contrast elements, compounds, and mixtures.</li> </ul>	<p>Homework Assignments</p> <ul style="list-style-type: none"> <li>• Structure Search and Identification</li> </ul> <p>Classroom Activities</p> <ul style="list-style-type: none"> <li>• Spring Scale Activity</li> <li>• Build a Beam Bridge</li> <li>• Tension and Compression</li> <li>• K-nex Beam Bridge</li> <li>• Shapes Activity</li> <li>• K-nex Shapes Activity</li> <li>• Build a Suspension Bridge</li> </ul> <p>Formal Assessment</p>	<ul style="list-style-type: none"> <li>• Schematic diagrams of electrical circuits</li> <li>• Lab Reports</li> <li>• List of conductors and insulators</li> <li>• Experiments demonstrated of circuits built</li> <li>• Writing explanations: how a light bulb works, how electricity is changed to other forms of energy.</li> <li>• Motor that works</li> <li>• Electromagnet that works</li> <li>• Compare electrical wiring in different places in the house</li> <li>• Electrical measurement calculations for voltage, resistance, amperage</li> <li>• Worksheets</li> <li>• Quizzes</li> <li>• Test</li> </ul>	<ul style="list-style-type: none"> <li>• Activities</li> <li>• Homework Assignments</li> <li>• Lab Reports</li> <li>• Formal Assessment</li> <li>• Graphs</li> <li>• Student Lab Responses Sheets / Data</li> <li>• Quizzes</li> <li>• Brochure</li> <li>• Physics Cartoon Viewers Guide</li> </ul>	<ul style="list-style-type: none"> <li>• Lab Reports</li> <li>• Test</li> <li>• Quizzes</li> <li>• Homework</li> <li>• Atomic Structure Diagrams</li> <li>• Electron Dot Diagrams</li> <li>• Activities</li> <li>• Chemical Reactions and Neutralization Worksheets</li> <li>• pH scale diagram</li> </ul>	<ul style="list-style-type: none"> <li>• Calculations of work</li> <li>• Calculations of mechanical advantage</li> <li>• tests</li> <li>• quizzes</li> <li>• homework</li> <li>• lab reports</li> </ul>

SKILLS						
	<ul style="list-style-type: none"> <li>• Describe properties of common elements</li> <li>• Find the mass and volume of an object.</li> <li>• Calculate the density of an object.</li> <li>• Separate a mixture into simpler parts.</li> <li>• Element presentation</li> <li>• Investigate solutions and what substances are soluble</li> <li>• Investigate ways to separate mixture components using experiments of solubility / boiling point</li> <li>• Investigate ways to separate mixtures physically by particle size</li> <li>• Compare elements, compounds, mixtures</li> <li>• Distinguish between an element, compound and mixture</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the type of support structure used in an application.</li> <li>• Establish which members of a support structure are under tension and compression.</li> <li>• Apply the principles of Newton's 3<sup>rd</sup> Law in order to establish the relative magnitude and direction of forces acting on an object.</li> <li>• Evaluate different support structures to determine if they are stable and meet the desired application.</li> <li>• Create a truss or suspension bridge that best meets the requirements.</li> <li>• Reflect on bridge designs to determine how their design could be improved.</li> </ul>	<ul style="list-style-type: none"> <li>• explain the relationship among voltage, current and resistance in a simple series circuit.</li> <li>• explain how electricity is used to produce heat and light in incandescent bulbs and heating elements.</li> <li>• describe the relationship between current and magnetism.</li> <li>• explain the design of electrical in a kitchen versus a bedroom</li> <li>• apply Ohm's Law</li> <li>• build and compare series and parallel circuits</li> <li>• draw and label circuit diagrams</li> <li>• use schematic drawings</li> <li>• measure voltage, amperage, resistance</li> <li>describe how a circuit works (how to reset a circuit)</li> </ul>	<ul style="list-style-type: none"> <li>• Use Newton's 3 laws to explain the motion of an object and give a sample example of each.</li> <li>• Describe the forces acting on an object moving in a circular path.</li> <li>• Use Newton's 2<sup>nd</sup> law formula to compare the force of different objects.</li> <li>• Illustrate the motion of objects using a distance vs. time graph.</li> <li>• Calculate the average speed of a moving object.</li> <li>• Describe distance as how far an object travels from its initial position to a final position.</li> <li>• Calculate distance.</li> <li>• Graph speed data using distance and time interval data.</li> <li>• Explain speed in terms of distance and time.</li> <li>• Describe the relationship between speed and the slope of distance-verses-time graph.</li> <li>• Explain the difference between constant velocity and acceleration.</li> </ul>	<ul style="list-style-type: none"> <li>• draw atomic structure diagrams</li> <li>• draw and explain dot diagrams</li> <li>• build models of atoms and compounds</li> <li>• use the Periodic Table to find and predict the following info: <ul style="list-style-type: none"> <li>- # protons, electrons, neutrons</li> <li>- # valence electrons</li> <li>- location of valence electrons</li> <li>- location of metals &amp; nonmetals</li> </ul> </li> <li>• explain the change of pH in neutralization reaction and that H<sup>+</sup> and OH<sup>-</sup> combine to make water (neutral)</li> <li>• describe characteristics of ionic and covalent compounds</li> <li>• describe chemical bonding using specific examples</li> <li>• explain the difference between acids and bases</li> <li>• determine the pH of common</li> </ul>	<ul style="list-style-type: none"> <li>• <u>use the formula <math>W = F \times D</math> to correctly calculate work done in lifting objects.</u></li> <li>• give real-life examples of simple machines</li> <li>• understand "mechanical advantage"</li> <li>• explain how simple machines create mechanical advantage (make work easier)</li> <li>• illustrate the use of simple machines to accomplish a common task</li> <li>• describe how different types of stored energy can be used to make objects move</li> </ul>

<b>SKILLS</b>				<ul style="list-style-type: none"><li>• Identify and interpret graphs to explain accelerating motion.</li><li>• Describe the effects of mass and angle of slope on the acceleration or rolling cars.</li><li>• Explain net force.</li><li>• Describe acceleration as a result of net force.</li><li>• Explain gravity as a universal force of attraction between masses</li><li>• Analyze collision interactions in terms of momentum and impulse.</li><li>• Describe the relationships among force, mass and changes in motion.</li></ul>	household substances <ul style="list-style-type: none"><li>• explain how bases neutralize acids to form salts</li><li>• identify examples of ionic and covalent compounds</li></ul>	
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