

**Science Standards:8th Grade**

Any strand **highlighted in yellow** has been determined by our WCSD teachers, district and state content experts as essential for students to master.

**Strand 8.1: Matter and energy interact in the physical world**

The physical world is made of atoms and molecules. Even large objects can be viewed as a combination of small particles. Energy causes particles to move and interact physically or chemically. Those interactions create a variety of substances. As molecules undergo a chemical or physical change, the number of atoms in that system remains constant. Humans use energy to refine natural resources into synthetic materials.

Learning Targets	Academic Vocabulary	Questions Stems	Possible Assessments
<p>Develop a model to describe the <u>scale and proportion</u> of atoms and molecules. Emphasize developing atomic models of elements and their numbers of protons, neutrons, and electrons, as well as models of simple molecules.</p> <p>Obtain information about various properties of matter, evaluate how different materials' properties allow them to be used for particular <u>functions</u> in society and communicate your findings. Emphasize general properties of matter.</p> <p>Plan and conduct an investigation and then analyze and interpret the data to identify <u>patterns</u> in changes in a substance's</p>	<p>Atom Molecule Proton Neutron Electron malleability solubility</p>	<p>String activity for scale and proportion for phenomena.</p> <ul style="list-style-type: none"> <li>- How can things be solid when there is so much space between parts of matter?</li> </ul> <p>How can you determine what the matter is from characteristics?</p> <p>What are some synthetic materials that you use everyday? Where did they come from?</p> <p>How does heat affect matter?</p> <p>How can you affect the rate of matter change due to heat?</p>	<p>Design, construct, and test a device that can <u>affect</u> the rate of a phase change.</p> <p>Design an accurate model of an atom.</p> <p>Students will prove with an experiment that the number of atoms don't change in a reaction by developing a model.</p> <p>Be able to conduct experiments to decide if a chemical reaction has occurred. Examples</p>

<p>properties to determine if a chemical reaction has occurred.</p> <p>Obtain and evaluate information to describe how synthetic materials come from natural resources, what their <u>functions</u> are, and how society uses these new materials.</p> <p>Develop a model that uses computational thinking to illustrate the <u>cause and effect</u> relationships in particle motion, temperature, density, and state of a pure substance when heat energy is added or removed.</p>			<p>could include changes in properties such as color, density, flammability, odor, solubility, or state.</p>
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**Strand 8.2: Energy is stored and transferred in physical systems**

Objects can store and transfer energy within systems. Energy can be transferred between objects, which involves changes in the object's energy. There is a direct relationship between an object's energy, mass, and velocity. Energy can travel in waves and may be harnessed to transmit information.

Learning Targets	Academic Vocabulary	Questions Stems	Possible Assessments
<p>Use computational thinking to analyze data about the relationship between the mass and speed of objects to the relative amount of kinetic energy of the objects. Emphasis should be on the <u>quantity</u> of mass and relative speed to the observable <u>effects</u> of the kinetic energy.</p> <p>Ask questions about how the amount of potential <u>energy</u> varies as distance within the</p>	<p>Kinetic Energy            Potential Energy            Quantitative            Qualitative            Light Waves            Mechanical Waves            Friction            Wave Energy            Amplitude            Sound Waves</p>	<p>Does the mass of an object affect its speed?</p> <p>How does the distance affect potential energy?</p> <p>How does friction affect speed of an object?</p> <p>How are different types of waves affected by different materials?</p>	<p>Provide a full cart vs. an empty cart or rolling spheres with different masses down a ramp to measure the effects on stationary masses. Make graphs, recognize patterns, and interpret the data from this experiment.</p>

<p>system changes. Plan and conduct an investigation to answer a question about potential <u>energy</u>.</p> <p>Engage in argument to identify the strongest evidence that supports the claim that the kinetic energy of an object changes as <u>energy</u> is transferred to or from the object.</p> <p>Use computational thinking to describe a <u>simple model</u> for waves that shows the <u>pattern</u> of wave amplitude being related to wave energy.</p> <p>Develop and use a model to describe the <u>structure</u> of waves and how they are reflected, absorbed, or transmitted through various materials..</p>			<p>Be able to plan and conduct and experiment with friction and heat.</p> <p>Be able to plan and conduct and experiment with applying force to an object.</p> <p>Use graphs, charts, computer simulations, or physical models to demonstrate amplitude and energy correlation.</p>
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**Strand 8.3: Life systems store and transfer matter and energy**  
 Living things use energy from their environment to rearrange matter to sustain life. Photosynthetic organisms are able to transfer light energy to chemical energy. Consumers can break down complex food molecules to utilize the stored energy and use the particles to form new, life-sustaining molecules. Ecosystems are examples of how energy can flow while matter cycles through the living and nonliving components of systems.

<p>Learning Targets</p> <p>Plan and conduct an investigation and use the evidence to construct an explanation of how photosynthetic organisms use <u>energy</u> to transform matter.</p>	<p>Academic Vocabulary</p> <p>Matter          Cellular Respiration          Ecosystem          Carbon Cycle</p>	<p>Questions Stems</p> <p>When you eat something, what changes happen to the food?           How do you get energy from food?</p>	<p>Possible Assessments</p> <p>Plant cuttings in syringes and students use this to show a photosynthetic reaction is taking place.</p>
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<p>Develop a model to describe how food is changed through chemical reactions to form new molecules that support growth and/or release energy as <u>matter</u> cycles through an organism.</p> <p>Ask questions to obtain, evaluate, and communicate information about how <u>changes</u> to an ecosystem affect the <u>stability</u> of cycling <u>matter</u> and the flow of <u>energy</u> among living and nonliving parts of an ecosystem.</p>	<p>Molecule Photosynthesis Molecular Transformation Energy Transformation Matter Cycling</p>	<p>How do changes in ecosystems affect its energy?</p>	<p>Explain the cycling of carbon.</p> <p>Describe energy flow in an ecosystem.</p> <p>Develop a model that shows molecular and energy change at the cellular level.</p>
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***Strand 8.4: Interactions with natural systems and resources***  
*Interactions of matter and energy through geologic processes have led to the uneven distribution of natural resources. Many of these resources are nonrenewable, and per-capita use can cause positive or negative consequences. Global temperatures change due to various factors, and can cause a change in regional climates. As energy flows through the physical world, natural disasters can occur that affect human life. Humans can study patterns in natural systems to anticipate and forecast some future disasters and work to mitigate the outcomes.*

<p>Learning Targets</p> <p>Construct a scientific explanation based on evidence that shows that the uneven distribution of Earth's mineral, energy, and groundwater resources is <u>caused</u> by geological processes.</p>	<p>Academic Vocabulary</p> <p>Mineral Ground Water Geologic Natural Resource Climate Agriculture Fossil Fuel Radiation</p>	<p>Questions Stems</p> <p>Why are the Earth's resources unevenly distributed?</p> <p>How does the world's population affect natural resources?</p> <p>How can the over consumption of groundwater affect the geology of an</p>	<p>Possible Assessments</p> <p>Compare Earth's resource distribution to Utah's resource distribution.</p> <p>Construct a graph showing the increased rate of natural resource consumption and the rate at which they are produced.</p>
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<p>Engage in argument supported by evidence about the <u>effect</u> of per-capita consumption of natural resources on Earth's systems.</p> <p>Design a solution to monitor or mitigate the potential <u>effects</u> of the use of natural resources.</p> <p>Analyze and interpret data on the factors that <u>change</u> global temperatures and their <u>effects</u> on regional climates.</p> <p>Analyze and interpret <u>patterns</u> of the occurrence of natural hazards to forecast future catastrophic events, and investigate how data is used to develop technologies to mitigate their effects.</p>	<p>Atmosphere</p>	<p>area?</p> <p>What local activities have an effect on regional climates?</p>	<p>Predict which natural resources will not be able to keep up due to human consumption.</p> <p>Construct some solutions to the natural resource dilemma.</p> <p>Analyzing of data to predict future happenings.</p>
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