

Pocatello/Chubbuck School District #25

Science: G6 Course 2

Unit 3: Changes of State

Grade: 6

Pacing: 2 WEEKS

**Unit Overview:** This brief unit deals with states of matter and their atomic structure, and changes in state of matter. During this unit learners will evaluate the process(es) involved in state changes, changes in energy in each state, and the effects of pressure and temperature.

**Anchor Phenomenon:** The unit will be supported by learner exploration of the anchoring phenomenon of Oobleck. While engaging in this phenomenon, learners will develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

**Crosscutting Concept:** *Cause and Effect*

**Science and Engineering Practice:** *Developing and Using Models*

**Disciplinary Core Ideas:** *The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.*

*Kinetic energy can be distinguished from the various forms of potential energy. Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.*

**FOCUS SCIENCE STANDARD / CONCEPT PROGRESSION**

5th Grade	6th Grade	High School
PS1-5-3. Make observations and measurements to identify materials based on their properties.	PS1-MS-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	PSC2-HS-3. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

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<p style="text-align: center;"><b>FOCUS AND ACCOMPANYING STANDARDS</b></p> <p>The <b>FOCUS</b> and accompanying standards are clustered with Learning Intentions and Success Criteria (LI/SC) identified to provide coherence in teaching and learning. It is from these standards, LI/SC, and Tasks/Assessments that PLCs create weekly learning intentions, success criteria and lesson plans.</p>	<p style="text-align: center;"><b>Learning Intentions</b></p>
<p>PS1-MS-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.</p>	<p>In this unit, learners will develop and use models to understand the cause and effect of how a pure substance changes when thermal energy is added or removed.</p>

<p style="text-align: center;"><b>IDAHO STANDARDS FOR LITERACY IN SCIENCE AND TECHNICAL SUBJECTS</b></p>
<p><b>Integration of Knowledge and Ideas:</b></p> <ul style="list-style-type: none"> <li>● RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</li> <li>● RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</li> <li>● RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</li> </ul> <p><b>Text Types and Purposes:</b></p> <ul style="list-style-type: none"> <li>● WHST.6-8.1: Write arguments focused on discipline-specific content.                     <ul style="list-style-type: none"> <li>○ WHST.6-8.1.A: Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.</li> <li>○ WHST.6-8.1.B: Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</li> <li>○ WHST.6-8.1.C: Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</li> <li>○ WHST.6-8.1.D: Establish and maintain a formal style.</li> <li>○ WHST.6-8.1.E: Provide a concluding statement or section that follows from and supports the argument presented.</li> </ul> </li> </ul>

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UNIT LEARNING INTENTIONS
<ul style="list-style-type: none"> <li>In this unit, learners will develop and use models to understand the cause and effect of how a pure substance changes when thermal energy is added or removed.</li> </ul>

SUCCESS CRITERIA ALIGNED TO UNIT LEARNING INTENTIONS		
SURFACE	DEEP	TRANSFER
<p><i>Conceptual understanding and foundational information; Initial acquisition of content understanding and associated procedural skills</i></p> <p>Almarode, Fisher, Frey, and Hattie, <i>Visible Learning for Science</i>. Corwin. 2018 p. 53</p>	<p><i>Uncovering relationships between terms, concepts, and ideas within a topic; understand how concepts are related to other scientific phenomena. Utilizing science process skills to plan, investigate, communicate and elaborate on initial learning, and extract generalizations about science content</i></p> <p>Almarode, Fisher, et al., <i>Visible Learning for Science</i>. Corwin. 2018 p. 82</p>	<p><i>Applying relevant scientific laws, principles, theories, and phenomena to construct solutions to problems and formulate new understandings within different contexts/disciplines</i></p> <p>Almarode, Fisher, et al., <i>Visible Learning for Science</i>. Corwin. 2018 p.128</p>
<ul style="list-style-type: none"> <li>I can create a simple model of a pure substance at the molecular level as a liquid, solid and gas.</li> <li>I can describe the changes that occur to a pure substance when thermal energy is added.</li> </ul>	<ul style="list-style-type: none"> <li>I can explain the relationship between thermal energy, kinetic energy, and temperature.</li> </ul>	<ul style="list-style-type: none"> <li>I can produce and present a model that predicts and describes changes in a pure substance when thermal energy is added or removed.</li> </ul>

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LEARNING PROGRESSION (READING, WRITING, TALKING)		
SURFACE	DEEP	TRANSFER
<p><i>Learners will:</i></p> <ul style="list-style-type: none"> <li>● model three states of matter to show how they differ in physical characteristics, particle motion, and kinetic energy.</li> <li>● explore the properties of matter in the three states of matter.</li> <li>● describe a model of the movement of particles at different states of matter.</li> <li>● develop a model that shows how the state of a pure substance can change with an increase or a decrease in thermal energy or pressure.</li> <li>● identify the cause and effect relationship between energy and changes of state.</li> <li>● recognize that matter can change from gas to a liquid or liquid to a solid as a result of the loss of thermal energy.</li> </ul>	<p><i>Learners will:</i></p> <ul style="list-style-type: none"> <li>● compare solids and liquids to determine how they are similar and different.</li> <li>● analyze whether particle behavior explains the properties of matter at each state.</li> <li>● compare and contrast the arrangement of particles at each state.</li> <li>● compare and contrast the motion of kinetic energy of particles in each state of matter.</li> <li>● compare structure and properties of matter before and after changes of state</li> <li>● identify cause and effect between an increase in thermal energy and specific changes of state.</li> </ul>	<p><i>Learners will:</i></p> <ul style="list-style-type: none"> <li>● evaluate a model of the different states of matter</li> <li>● produce and present a model that predicts and describes changes in a pure substance when thermal energy is added or removed.</li> </ul>

KEY ACADEMIC VOCABULARY
solid, liquid, gas, definite, indefinite, particle, particle attraction, particle motion, kinetic energy, change of state, thermal energy, temperature, melting, melting point, evaporation, boiling, boiling point, freezing, freezing point, condensation, pressure

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REQUIRED SUMMATIVE ASSESSMENT (Administered 'On Demand')	
<b>Learning Intention</b>	In this unit, learners will understand how a pure substance changes when thermal energy is added.
<b>Success Criteria</b>	<ol style="list-style-type: none"><li>1. Proficient (70%) score in Science Dimensions Module J Unit 2 Summative Assessment</li><li>2. Proficient (70%) score using rubric for Argumentative Essay Response</li></ol>
<b>Resource Options for Summative Assessment</b>	<ol style="list-style-type: none"><li>1. Science Dimension Module J Unit 2B Summative Assessment</li><li>2. Argumentative Essay Prompt</li></ol>

VETTED MATERIALS/RESOURCES
Science Dimensions Module J Unit 2