

Episode 5

Strand 6.2	Standard 6.2.2	Big Idea Adding or removing thermal energy causes the arrangement and motion of molecules of a substance to change.
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Title How do substances change from a solid to a liquid or a liquid to a gas?	Time 40 minutes	CCCs Systems Cause and Effect	Practices Develop and use models
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Phenomenon: Ice melts in a pan and becomes water; the water boils and becomes steam.

Gathering

Use Models to Gather Data and Information

Students will observe as an ice cube begins to melt and water starts to boil and evaporate. Students will form initial models of the system by describing what they think is happening and changing on the visible and molecular level. Models should include the heat source and the flow of thermal energy.

Teacher Support: The teacher should walk around and ask students to describe their developing ideas on their models in order to understand students' current levels of understanding of the system. [Phase Change in water video](#) Few students will actually be able to describe what the terms heat, hot, or temperature actually mean. They will have little understanding of what is happening to the molecules on the molecular level.

Reasoning

Use Models to Predict and Develop Evidence

Students will use their constructed models to write cause and effect relationships concerning what happens to the states of matter when heat energy is added. Students' statements should include the effect of heat energy in both a solid and a liquid. Statements can include a change in state of matter, density, or arrangement of particles.

Argue From Evidence

Students will list their cause and effect statements on the board. The class will then discuss whether they agree or disagree with the statements using the evidence they have gathered.

Communicating

Use Models to Communicate

Students will construct an explanation and use a model to describe what happens when thermal energy is added to a solid and a liquid at a visible and molecular level. Students will present their explanations and models to the class.

Teacher Support: Students' models of this phenomenon will be revisited and revised in 6226 when more information is obtained about heat energy and its effect on the molecules of a substance.

Assessment: Students' explanations should include that added heat causes the molecular arrangement of solids and liquids to change, causing the state of matter to change.

Materials, resources, handouts, etc.

[Model handout 6224a](#)

[Phase Change in water video](#)