

Criteria	Beginning (1 point)	Developing (2 points)	Proficient (3 points)	Exemplary (4 points)
Particle Representation (Liquid)	Particles are drawn, but motion is unclear or inaccurate.	Particles are shown with some indication of movement.	Particles are clearly shown moving randomly and spaced appropriately.	Particles are accurately depicted with varying speeds and spacing.
Particle Representation (Solid)	Particles are drawn, but arrangement is unclear.	Particles are shown somewhat close together.	Particles are clearly shown closely packed in a more ordered pattern.	Particles are accurately depicted with minimal motion in a fixed arrangement.
Energy Transfer (Cooling)	No clear indication of energy removal.	An attempt is made to show cooling.	Clearly shows thermal energy being removed from the creamer.	Effectively illustrates the transfer of energy to the ice bath.
Temperature & Motion (Cooling)	No clear connection between cooling and particle motion.	A basic connection is attempted (e.g., "gets colder").	Explains that cooling slows down particle motion.	Clearly links the removal of energy to decreased kinetic energy and slower particle movement.
State Change (Liquid to Solid)	The change in state is shown, but particle behavior is unclear.	An attempt is made to link particle behavior to the state change.	Explains how the change in particle motion leads to the solid state.	Clearly articulates the role of reduced kinetic energy and intermolecular forces (implicitly through particle behavior) in the phase change.
Prediction (Melting)	No prediction or inaccurate prediction.	A basic prediction is made (e.g., "it will melt").	Predicts that warming will increase particle motion and return to liquid.	Accurately predicts the increase in particle kinetic energy and overcoming of intermolecular forces (implicitly through particle behavior) during melting.
Labels & Captions	Few or unclear labels/captions.	Some labels/captions are present but lack detail.	Clear and accurate labels/captions are used to explain the science.	Detailed and insightful labels/captions enhance the understanding of the model.