Overview
To develop assessment tasks that align with the Next Generation Science Standards (NGSS), we systematically unpack performance expectations into statements called learning performances. Learning performances take on the structure of the performance expectations by integrating three dimensions of science proficiency—disciplinary core ideas, science and engineering practices, and crosscutting concepts. A single learning performance describes an essential part of the proficiency students must meet to achieve a performance expectation. Together, a set of learning performances allow developers to create a coherent set of assessment tasks covering the full scope of a performance expectation. This poster illustrates a principled approach for using learning performances to design NGSS-aligned assessment tasks.

1 Identify Target Performance Expectations
MS-PS1-4: 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.

Unpack the Dimensions of the Target PE

2a Unpack Disciplinary Core Ideas
- Identify an aspect of a disciplinary core idea
- Elaborate the meaning of key sub-ideas
- Define assessment boundaries
- Describe prerequisite knowledge
- Identify student challenges
- Describe relevant phenomena

2b Unpack the Science Practices
- Identify aspects of the practice
- Describe evidence required to demonstrate practice
- Describe prerequisite knowledge
- Identify student challenges
- Specify key intersections with other practices

2c Unpack the Crosscutting Concepts
- Identify aspects of the crosscutting concept
- Describe evidence required to demonstrate application of the crosscutting concept
- Describe prerequisite knowledge
- Specify key intersections with practices

Task Design Process Schematic

3 Create Integrated Dimension Map
- Domain Analysis
  - Unpack Disciplinary Core Ideas
  - Unpack Practices
  - Unpack Crosscutting Concepts
- Domain Modeling
  - Create Integrated Dimension Map

4 Articulate Learning Performances
- Learning Performances for MS-PS1-4
  - LP 1: Students develop a model that explains how the change in particle motion when thermal energy is transferred to or from a substance without changing state.
  - LP 2: Students develop a model that explains how particle motion changes when thermal energy is transferred to or from a substance without changing state.
  - LP 3: Students develop a model to explain the state of a substance caused by transferring thermal energy to or from a sample.
  - LP 4: Students use evidence from a simulation to construct a scientific explanation about how the average kinetic energy and the temperature of a substance change when thermal energy is transferred from or to a sample.
  - LP 5: Students develop a model that includes a particle viewpoint of matter to predict how the average kinetic energy and the temperature of a substance change when thermal energy is transferred from or to a sample.

5 Specify Task Design Patterns
- Design pattern for LP 2
  - Focal Knowledge, Skills, and Abilities
    - Ability to develop a model that explains the change in motion of particles resulting from the transfer of thermal energy
    - Ability to support the model with a statement describing the causal relationship between thermal energy change and particle motion change
    - Ability to represent the correspondence between model features and matter particles and particle speed
    - Students 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.

6 Example Task for LP 2
- LP 2 Example Task
  - Shown first: Initial state of matter is solid temperature. Second state: The cup is heated and a substance is added to it. Third state: The cup is cooled and the solid returns to its initial state.
  - Students develop a model that explains how particle motion changes when thermal energy is transferred to or from a substance without changing state.

*Indicates features specifically informed by our fairness/equity framework.