

## 5-PS1-2 Matter and Its Interactions

Students who demonstrate understanding can:

- 5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

#### Using Mathematics and Computational Thinking

Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

- Measure and graph quantities such as weight to address scientific and engineering questions and problems.

### Disciplinary Core Ideas

#### PS1.A: Structure and Properties of Matter

- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.

#### PS1.B: Chemical Reactions

- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)

### Crosscutting Concepts

#### Scale, Proportion, and Quantity

- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

#### Connections to Nature of Science

#### Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes consistent patterns in natural systems.

### Observable features of the student performance by the end of the grade:

1	Representation
	a Students measure and graph the given quantities using standard units, including: <ul style="list-style-type: none"> <li>i. The weight of substances before they are heated, cooled, or mixed.</li> <li>ii. The weight of substances, including any new substances produced by a reaction, after they are heated, cooled, or mixed.</li> </ul>
	2 Mathematical/computational analysis
2	a Students measure and/or calculate the difference between the total weight of the substances (using standard units) before and after they are heated, cooled, and/or mixed.
	b Students describe* the changes in properties they observe during and/or after heating, cooling, or mixing substances.
	c Students use their measurements and calculations to describe* that the total weights of the substances did not change, regardless of the reaction or changes in properties that were observed.
	d Students use measurements and descriptions* of weight, as well as the assumption of consistent patterns in natural systems, to describe* evidence to address scientific questions about the conservation of the amount of matter, including the idea that the total weight of matter is conserved after heating, cooling, or mixing substances.