

1. Essential Element

Activity/Lesson Title: Conservation of Matter

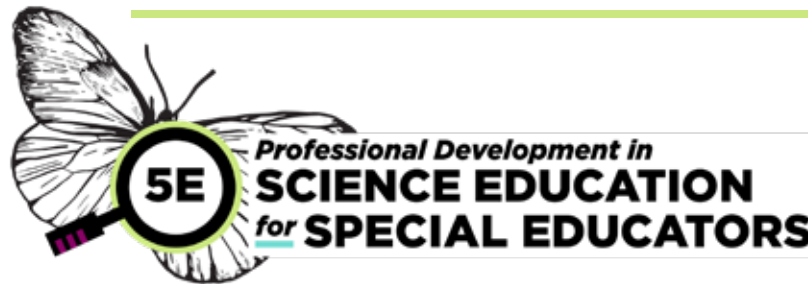
EE.5.PS1-2: Measure and compare weights of substances before and after heating, cooling, or mixing substances to show that weight of matter is conserved

Teacher: Nora

Grade Level: 5

Student: Sydney

Linkage Level: Precursor



2. Science and Engineering Practice

SEP 5: Using Mathematics & Computational Thinking

SEP description: Supports students as they measure and compare quantities (such as weight, height, and length) to answer science questions. Students use tools to measure and record data and then display data using simple graphs.

3. Disciplinary Core Idea

Structure and Properties of Matter

Core Idea description: The amount (or weight) of matter is conserved when it changes form, even in transitions (like when water boils) when it seems to vanish. No matter what the reaction or change in properties that occurs, the total weight of the substances does not change [Mass and weight are not distinguished at this grade level].

4. Crosscutting Concept

Scale, Proportion, and Quantity

Concept Description: Students in grades 3-5 learn that standard units are used to measure and describe physical quantities such as length and weight. They also gather and sort relevant science information from print or digital sources into given categories and use standard units to measure weight and length.

5. Linkage Level Descriptors

Initial: Recognize the change in state from liquid to solid or from solid to liquid of the same material.

Precursor: Compare the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid.

Target: Measure and compare weights of substances before and after heating, cooling, or mixing substances to show that weight of matter is conserved.

6. Student's Typical Accessibility Supports

- Head switch
- Assistive technology device that presents 8 choices per page
- Tactile objects for representations

7. Student Prior Experiences, Prior Knowledge

- The student compares liquid quantities successfully.
- The student has prior knowledge about hot, cold, freezing, and melting.
- The student responds well to science concepts presented through stories.
- The student likes using science equipment during experiments.

8. Phenomenon to Explore

Questions

- What happens to the weight of substances when their physical properties change (e.g., melting or freezing)?
- Does a frozen popsicle weigh the same after it melts?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that:

- Matter “disappears” when it goes through a physical change (such as when water evaporates).
- Substances that cannot be seen do not have weight (e.g., when liquids become gases after they boil).
- Weight changes when physical properties change (e.g., when substances melt or freeze).

10. UDL Options and Solutions to Potential Barriers

- Use alternate weighing tools (i.e., talking scales)
- Assist with weighing objects

11. Engage

Think

- How can I make sure to access student prior learning?
- How can I use the CCC to connect everyday language with scientific language of the phenomenon?
- How can I support student participation by scaffolding the SEP?

Teacher Will

- Do a shared reading session using an accessible book titled "[Melt and Freeze](#)".
- Help students access and watch a time-lapse video of a popsicle melting.
- Ask students what questions they have about substances that melt.
- Ask students questions like:
 - » What changes are happening with the popsicle?
 - » How is this like what we read about in the book "[Melt and Freeze](#)"?
 - » Do you think the popsicle will weigh the same or different after it melts?
 - » How can we find out?

Students Will

- Talk about the story and share experiences of eating popsicles.
- Share ideas about what they think will happen to the weight of the popsicle after it melts.

12. Explore

Think

- What is difficult or inaccessible about the phenomenon, and how can I make it more accessible in the Explore phase?
- How can students collect data in a way that helps answer a scientific question?
- How can I encourage students' careful observation and asking good questions vs. looking for only the "right answer"?

Teacher Will

- Help students gather data on how much solid or frozen items weigh before and after melting
- Ask students what substance they want to investigate (butter, ice, or a popsicle)
- Guide students in measuring the weight of the substance as a solid, recording the amount on the class chart, melting the substance (either in a microwave or in a sunny windowsill), and then weighing and recording the liquid after melting
- Provide direct instruction as needed on weight units or how to use the scale.
- Ask probing questions to allow students to predict what they think the weight will be: Same or Different.
- Assist students in keeping track of their predictions and data on the class chart.

Students Will

- Choose the substance they want to investigate.
- Carry out the investigation.
- Use a scale to weigh substances before and after melting.
- Compare the weights and decide if they are the same or different.
- Add data to the class data chart.

13. Explain

Think

- How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?

Teacher Will

- Assist students in noticing that the weight of the substance is the same before and after melting.
 - » If the weights were not the same, help them figure out why.
 - » For example:
- Was some of the substance spilled during melting?
- Were the container weights subtracted (or the scale tared) so that only the weights of the contents were examined?
 - » Was any spilled material on the scale?
 - » Guide students through questioning to the understanding that weight is a property of the substances that does not change.
- Teach vocabulary word "substance".

Students Will

Complete a CER statement

Claim: The weight of substances stays the same after melting

Evidence:

- » I see on the class data chart that the weight of a popsicle did not change.
- » I also saw that the weight of butter did not change.

Reasoning: I compared the weights of the substances and saw that they were the same before and after melting.

14. Elaborate

Think

- How can I help enrich or extend student ideas? Are there related science concepts that would support and extend student learning?

Teacher Will

- Monitor students so they are applying independently this 2nd application as much as possible.
- Ask how else they could tell that the popsicle's weight did not change.

Students Will

- Choose another substance, such as ice cream or solid vegetable shortening.
- Explore/Explain the process for this different context.
- Complete a CER statement

15. Evaluate

Think

- What do I need to see or hear from my students that assures that they have learned the science content? What information do I need to gather to inform my teaching as I move through the lesson?

Teacher Will

- Monitor students' responses to questions during the lesson; adapt the lesson as needed to address student ideas; administer a summative assessment.

Students Will

- Respond to questions posed by teacher, make measurements and observations, organize data they gather, describe or label their data (same/ different), complete a CER statement using data as evidence, do a "think aloud" about their findings.