



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 5 Science

Unit 1 Task 3 Specification Tool & Verification of Alignment

Matter and Its Interactions

September 2023

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SIPS Grade 5 Unit 1 Task 3 Specification & Verification of Alignment

Grade: 5

Unit: 1

Task Number: 3

Task Title: Change or Not?

NGSS Performance Expectations

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.]*

5-PS1-3. Make observations and measurements to identify materials based on their properties. *[Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]*

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Phenomena or Phenomena-rooted Design Problem

- Regardless of the of change that occurs (i.e., chemical), the total weight of matter is conserved even when a new substance (i.e., precipitate) is formed.

Scenario/Context/Situation/Boundaries

- The scenario includes a situation in which students plan an investigation to determine if a change in total mass occurs when substances are mixed.

Variable Features to Shift Complexity or Focus

- Complexity of scientific concept(s) to be modeled.
- Format of "real-world" phenomenon under investigation: image, data, text, combination.
- Domain-specific vocabulary.
- Number, type, and complexity of representations of tables, graphs, and/or data sets.
- Compare data from the original substances to data from the substance produced.
- Type of methods to determine whether the mixing of two or more substances results in new substances.

General Description of Task / Chain of Sensemaking

- Students are provided a context, asked a question related to whether the mixing of two or more substances results in a new substance being formed, and use observations to support their conclusion. **[Prompt 1: 5-PS1-3 & 5-PS1-4, KSA1]**
- Students graph the data to show that the total amount of matter was conserved during the change to determine if the weight stays the same after mixing two substances and provide support for this conclusion. **[Prompt 2: 5-PS1-2, KSA4]**

Targeted PE-related KSAs

5-PS1-2, KSA4: Measure and graph quantities to provide evidence and describe how the collected data can serve as evidence for whether the mixing of the two or more tested substances results in one or more new substances and that the total weight of matter is conserved.

Cross-performance Expectations Related KSAs to Target

5-PS1-3 & 5-PS1-4, KSA1: Use observations and measurements as evidence to explain whether the mixing of two or more substances results in new substances.

Student Demonstrations of Learning

- Correctly uses quantitative and qualitative data to describe the quantitative and qualitative properties of the resulting substances.
- Accurately and completely describes the quantitative and qualitative properties of the resulting substances.
- Identifies, tests, and uses cause-and-effect relationships to explain change.
- Completes an appropriate explanation, using evidence, that regardless of the type of change that matter undergoes, the mass is conserved.

Work Products

- Graphs.
- Interpretation of data.
- Constructed response.

Application of Universal Design for Learning-based Guidelines to Promote Accessibility (<https://udlguidelines.cast.org/>)

Means of Engagement	Multiple Means of Representation	Multiple Means of Action & Expression
<ul style="list-style-type: none"> Context or content. Age appropriate. Appropriate for different groups. Makes sense of complex ideas in creative ways. Vary the degree of challenge or complexity within prompts. 	<ul style="list-style-type: none"> Provide visual diagrams and charts. Make explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams. Activating relevant prior knowledge. Highlight or emphasize key elements in text, graphics, diagrams, and formulas. Use outlines, graphic organizers, unit organizer routines, concept organizer routines, and concept mastery routines to emphasize key ideas and relationships. Give explicit prompts for each step in a sequential process. 	<ul style="list-style-type: none"> Solve problems using a variety of strategies. Sentence starters. Embed prompts to “show and explain your work”.

SIPS Assessments Complexity Framework Components

Prompt	A.1 Degree and nature of sense-making about phenomena or problems			B.1 Complexity of the presentation			B.2 Cognitive demand of response development			B.3 Cognitive demand of response production		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
1		X			X			X			X	
2			X		X			X				X

Rubric Considerations

- Accuracy of the data and data representations.
- Sophistication of the explanations.
- Correctness of the identification of whether or not a new substance was created.
- Correctness and/or appropriateness of the properties and their measurements/observations.

Assessment Boundaries

- Assessment does not include distinguishing mass and weight.
- Students are not expected to apply proportional reasoning skills (Note: should not be included, as students learn proportions in grade 6, CCSSM).

Common Misconceptions

- **5-PS1-2**
 - Solids are always heavier than liquids.
 - Gases are weightless.
 - An increase or decrease in weight during a physical or chemical change indicates that matter is not conserved.
- **5-PS1-3**
 - All shiny/reflective objects are made of metal.
 - All metal objects are attracted to magnets.
 - Charged objects never interact with neutral objects.
 - Larger magnets are always stronger magnets.
- **5-PS1-4**
 - Physical changes are irreversible.
 - When matter dissolves or evaporates, it ceases to exist.
 - Color changes always indicate a chemical change.
 - All temperature changes that result from mixing substances indicate a chemical change.

Possible Technical Terms for Task

- solubility, matter, physical properties, chemical change, substance

Common Core State Standards for Literacy

Writing

- **W.5.7** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. **(5-PS1-2), (5-PS1-3), (5-PS1-4)**
- **W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work and provide a list of sources. **(5-PS1-2), (5-PS1-3), (5-PS1-4)**
- **W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. **(5-PS1-2), (5-PS1-3), (5-PS1-4)**

Common Core State Standards for Mathematics

Mathematical Practices

- **MP.2** Reason abstractly and quantitatively. **(5-PS1-2), (5-PS1-3)**
- **MP.4** Model with mathematics. **(5-PS1-2), (5-PS1-3)**
- **MP.5** Use appropriate tools strategically. **(5-PS1-2), (5-PS1-3)**

Mathematics

- **5.MD.A.1** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. **(5-PS1-2)**

Task Notes

SIPS Assessments Complexity Framework

Component	Complexity		
	Low	Moderate	High
Connections to Curriculum and Instruction	<p>A.1 Degree and nature of sense-making about phenomena or problems</p> <ul style="list-style-type: none"> Requires one or two dimensions One dimension may have a greater degree of emphasis than another Requires previously learned ideas or concepts 	<ul style="list-style-type: none"> Requires integration of two dimensions in the service of sense-making Requires integration of same or different combinations of dimensions as represented in the PE bundle Requires a combination of previously learned ideas or concepts and newly presented information 	<ul style="list-style-type: none"> Requires integration of three dimensions in the service of sense-making Requires integration of same or different combinations of dimensions as represented in the PE bundle Requires a combination of previously learned ideas or concepts and newly presented information
Characteristics of the Tasks	<p>B.1 Complexity of the presentation</p> <ul style="list-style-type: none"> The amount and type of information provided in the scenario supports limited simple connections among ideas or concepts Provides few, simple graphics/data/models Includes definitions or examples Phenomenon or problem is presented in a concrete way with high level of certainty 	<ul style="list-style-type: none"> The amount and type of information provided in the scenario supports multiple evident connections among ideas or concepts Provides graphics/data/models Limited use of definitions or examples Phenomenon or problem presented with some level of uncertainty 	<ul style="list-style-type: none"> The amount and type of information provided in the scenario supports multiple and varied complex connections among ideas or concepts Provides complex graphics/data/models Phenomenon or problem presented with high-degree of uncertainty
	<p>B.2 Cognitive demand of response development</p> <ul style="list-style-type: none"> Requires well-defined set of actions or procedures Requires a connection or retrieval of factual information Response requires a low level of sophistication with routinely encountered well-practiced applications 	<ul style="list-style-type: none"> Requires application of ideas and practices given cues and guidance Requires drawing relationships and connecting ideas and practices Response requires a moderate level of sophistication with typical but relatively complex representation of ideas and application of skills 	<ul style="list-style-type: none"> Requires selection and application of multiple complex ideas and practices Requires high degree of sense-making, reasoning, and/or transfer Response requires a high level of sophistication with non-routine or abstract representation of ideas and application of skills

**B.3 Cognitive
demand of response
production**

- Responses include selection from a small set of options presented as text (e.g., word, short phrase) or other formats (e.g., a simple graphic or process)
 - Responses include one or more sentences or a paragraph, a moderately complex graphic, or multiple steps in a simple or moderately complex process
 - Responses include multiple paragraphs, multiple graphics of at least moderate complexity, or multiple steps in a complex process
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