Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project

Grade 5 Science
Unit 1 End of Unit Assessment Unpacking Tools
Matter and Its Interactions
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SIPS Grade 5 Unit 1 End of Unit Assessment Unpacking Tools

NGSS Performance Expectation: 5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [*Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.*]

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	**SEP: Developing and Using Models** ● Develop a model to describe phenomena. ● Use a model to describe phenomena.	**PS1.A: Structure and Properties of Matter** Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.	**CCC: Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large.
Key Aspects	● Identify components of the model. ● Use a model to reason about a phenomenon. ● Reason about the relationship of the different components of a model. ● Select and identify relevant aspects of a situation or phenomena to include in the model.	● Everything around us (matter) is made up of particles that are too small to be seen. ● Matter that cannot be seen can be detected in other ways. ● Gas (air) has mass and takes up space. ● Gas (air) particles, which are too small to be seen, can affect larger particles and objects. ● Gas particles freely move around in space, until they hit a material that keeps them from moving further, thus trapping the gas (e.g., air inflating a basketball, an expanding balloon).	● Understand the units used to measure and compare quantities. ● Describe relationships between natural objects which vary in size (very small to the immensely large). ● Understanding of scale involves not only understanding systems and processes vary in size, time span, and energy, but also different mechanisms operate at different scales.
Prior Knowledge	● Knowledge that a model contains elements (observable and unobservable) that represent specific aspects of real-world phenomena. ● Knowledge that models are used to help explain or predict phenomena.	● Matter is anything that occupies space and has mass. ● Matter can change in different ways. ● A great variety of objects can be built up from a small set of pieces.	**Relationships to SEPs:** **2) Developing and Using Models; and 3) Planning and Carrying Out Investigations** ● Models describe the scale of natural objects when developing models. ● Model with mathematics to describe phenomenon. ● Conduct investigations to produce data. ● Data analysis serves to demonstrate the relative magnitude of some properties or processes.

NGSS Performance Expectation: 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.*]

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	**SEP: Using Mathematics and Computational Thinking** ● Measure and graph quantities such as weight to address scientific and engineering questions and problems.	**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.)	**CCC: Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
Key Aspects	● Decide if qualitative or quantitative data are best to determine whether a proposed object or tool meets criteria for success. ● Organize simple data sets to reveal patterns that suggest relationships. ● Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems. ● Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem.	● Chemical or physical reactions that occur when substances are mixed or change form can be identified; the total mass remains the same. ● No matter what reaction or change in properties occurs, the total weight of the substances does not change. ● The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.	● Measure and describe physical quantities such as weight, time, temperature, and volume. ● Collect and record data according to the given investigation plan.
Prior Knowledge	● Decide when to use qualitative vs. quantitative data. ● Use counting and numbers to identify and describe patterns in the natural and designed world(s). ● Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs. ● Use quantitative data to compare two alternative solutions to a problem.	● Heating and cooling substances cause changes that are sometimes reversible, and sometimes they are not. ● Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. ● Matter can be described and classified by its observable properties.	**Relationships to SEPs:** **3) Planning and Carrying Out Investigations; and 5) Using Mathematics and Computational Thinking** ● Planning and carrying out investigations support students in identifying phenomena to be investigated, and how to observe, measure, and record outcomes. ● Conducting investigations to produce data to serve as the basis for evidence. ● Data analysis serves to demonstrate the relative magnitude of some properties or processes.

NGSS Performance Expectation: 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.*]

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	**SEP: Planning and Carrying Out Investigations** Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**PS1.A: Structure and Properties of Matter** Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.)	**CCC: Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
Key Aspects	● Make observations to collect data. ● Make measurements to collect data. ● Use data from an investigation as evidence for an explanation of a phenomenon or to support an explanation. ● Identify the purpose of the investigation.	● Properties can be used to identify materials. ● Properties can be measured. ● Materials can be identified based on their observable and measurable properties. ● Properties of materials may include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility.	● Measure and describe physical quantities such as weight, time, temperature, and volume. ● Collect and record data according to the given investigation plan. ● Understand the units used to measure and compare quantities.
Prior Knowledge	● Knowledge of units and unit conversions among different-sized standard measurement units within a given measurement system. ● Knowledge of bar graphs and histograms. ● Knowledge of line graphs (Note: CCSS Mathematics: "Students solve problems involving information presented in line plots" beginning in grade 5). ● Knowledge of how and when to use estimations.	● Matter is anything that occupies space and has mass. ● Everything around us has unique properties that can be used to identify them, such as what color they are, how hard they are, if they reflect light, whether they conduct electricity or heat, whether they are magnetic, and whether they dissolve in water. ● Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. ● Matter can be described and classified by its observable properties. ● Different properties are suited to different purposes.	**Relationships to SEPs:** **2) Developing and Using Models; and 3) Planning and Carrying Out Investigations** ● Models describe the scale of natural objects when developing models. ● Model with mathematics to describe phenomenon. ● Measure properties of materials accurately. ● Data analysis serves to interpret quantitative measures of properties, in standard units. ● Conduct investigations to produce data.

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

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)	
Foundations	**SEP: Planning and Carrying Out Investigations** Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	**PS1.A: Structure and Properties of Matter** When two or more different substances are mixed, a new substance with different properties may be formed.	**CCC: Cause and Effect** Cause and effect relationships are routinely identified and used to explain change.	
Key Aspects	● Plan an investigation with desired outcome in mind. ● Choose substances to be mixed. ● Identify substance that will be the control variable-emphasis on what a control is. ● Provide evidence to support explanations or design solutions. ● Understand both quantitative and qualitative data. ● Know which properties are quantitative and which are qualitative. ● Record number of trials for investigation. ● Students collaboratively collect and record data, including data about the substances before and after mixing.	● Elements react with one another to form new substances which can be identified by their new properties. ● Once a chemical change has occurred, it can't be undone.	● Look at the properties of beginning substances and compare them to the properties of final product. ● Use that information to decide if a change has occurred and formed a new substance. ● Describe the cause and effect relationship of the change they see after mixing the substances. ● Identify cause and effect relationships with respect to changes in substances before and after mixing.	
Prior Knowledge	● Identify observable properties of matter. ● Working collaboratively to carry out an investigation.	● Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. ● Objects can be built up from smaller parts.	**Relationships to SEPs:** **3) Planning and Carrying Out Investigations; and 5) Using Mathematics and Computational Thinking**	● Use fair tests to produce data to identify and explain change. ● Explanations of phenomena using evidence based on observed relationships, including cause and effect relationships ● Data analysis serves to interpret quantitative measures of properties. ● Use mathematics and computational thinking to identify and explain cause and effect relationships.