

DCI: Matter and Its Interactions

5.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. (5-PS1-1)

DCI: Matter and Its Interactions

5.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. (5-PS1-2)

DCI: Matter and Its Interactions

5.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.) (5-PS1-3)

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5.PS1.B: Chemical Reactions

When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)

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5.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.) (5-PS1-2)

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 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.

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.

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.

Performance Expectation

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

Clarification Statement: none

Assessment Boundary: none

Science and Engineering Practice

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

Develop a model to describe phenomena. (5-PS1-1)

Science and Engineering Practice

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

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. (5-PS1-4)

Science and Engineering Practice

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

Science and Engineering Practice

Using Mathematics and Computational Thinking

Mathematical and computational thinking at the 3–5 level 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. (5-PS1-2)

Crosscutting Concept

Cause and Effect

Cause and effect relationships are routinely identified and used to explain change. (5-PS1-4)

Crosscutting Concept

Scale, Proportion, and Quantity

Natural objects exist from the very small to the immensely large. (5-PS1-1)

Crosscutting Concept

Scale, Proportion, and Quantity

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2), (5-PS1-3)

Connection to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes consistent patterns in natural systems. (5-PS1-2)

Common Core State Standards for ELA/Literacy

Reading Informational Text

RI.5.7 - Integration of Knowledge and Ideas

Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS1-1)

Common Core State Standards for ELA/Literacy

Card Type name

W.5.7 - Research to Build and Present Knowledge

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)

Common Core State Standards for ELA/Literacy

Card Type name

W.5.8 - Research to Build and Present Knowledge

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)

Common Core State Standards for ELA/Literacy

Card Type name

W.5.9 - Research to Build and Present Knowledge

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

Measurement & Data

5.MD.A.1 - Convert like measurement units within a given measurement system.

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)

Common Core State Standards for Mathematics

Measurement & Data

5.MD.C.3 - Geometric measurement: understand concepts of volume.

Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)

Common Core State Standards for Mathematics

Measurement & Data

5.MD.C.4 - Geometric measurement: understand concepts of volume.

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

Common Core State Standards for Mathematics

Number & Operations in Base Ten

5.NBT.A.1 - Understand the place value system.

Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left. (5-PS1-1)

Common Core State Standards for Mathematics

Number & Operations--Fractions

5.NF.B.7 - Apply and extend previous understandings of multiplication and division.

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)

Common Core State Standards for Mathematics

Mathematical Practices

MP.2 - Reason abstractly and quantitatively

CCSS text (5-PS1-1), (5-PS1-2), (5-PS1-3)

Common Core State Standards for Mathematics

Mathematical Practices

MP.4 - Model with mathematics

CCSS text (5-PS1-1), (5-PS1-2), (5-PS1-3)

Common Core State Standards for Mathematics

Mathematical Practices

MP.5 - Use appropriate tools strategically

CCSS text (5-PS1-2), (5-PS1-3)