12 Week Unit

UNIT 1 STRUCTURE AND PROPERTIES OF MATTER

Second Grade | Rogers Public Schools

Unit 1: Structure and Properties of Matter 12 weeks

In this first unit, students describe and classify matter using observable properties. They will understand that different kinds of matter exist, and that temperature plays a role in the type of matter – many can be either solid or liquid. Students will understand that heating or cooling a substance may cause changes that can be observed. Some of the changes can be reversed, but some cannot.

Students will be able to identify different types of materials and compare the properties of different materials. They will investigate different materials and their properties in order to determine purposes and use of the materials. They will understand and identify ways people use materials and identify natural and man-made materials. Students will also understand that objects can be built up from a smaller set of pieces, or that objects may break into smaller pieces and can be put together into larger pieces or change shapes. They will understand how these pieces and their shapes work together as a system, as well as how the materials and shapes affect a structure.

Students will understand that simple tests can be designed to gather evidence to support or refute student ideas. Through collaboration, students will plan and conduct investigations to describe and classify materials and understand changes that can occur with heating or cooling substances. They will analyze data collected from testing different materials and will use evidence collected through observations and investigations to construct arguments and claims.

Unit 1 Performance Expectations

- **2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]
- **2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*** [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]
- **2-PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]
- **2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** [Clarification Statement: Examples of reversible changes could include materials such as water or butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

In Unit 1, students will understand…

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.
- 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.
- Objects can be built up from a small set of pieces; objects may break into smaller pieces and be put together into larger pieces, or change shapes.
- Objects or samples of a substance can be weighed, and their size can be described and measured.
- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Unit 1 Essential Questions:

- How do the properties of materials determine their use?
- How are materials similar and different from one another?
- How can matter change?

Additional Content Connections:

*These connections provide opportunities to score to other content standards with focused instruction.

ELA:

- Speaking and Listening
  - SL.2.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups
  - SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Math:

- Measurement and Data
  - 2.MD.D.10 Draw a picture graph and a bar graph, with single-unit scale, to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Unit Vocabulary:

question	matter	mass
observe/observation	solid	materials
measure	liquid	natural
record	states	synthetic
investigate/investigation	temperature	color
evidence	properties	texture
claim	purpose	hardness
engineer/engineering	melt	flexibility
reversible change	heating	strength
irreversible change	cooling	absorbency

Structure and Properties of Matter

Students who demonstrate understanding can:

2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water or butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*.

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)

Engaging in Argument from Evidence

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Construct an argument with evidence to support a claim. (2-PS1-4)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- 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. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2, 2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

PS1.B: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

Cause and Effect

- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)