5th Grade Unit 1 - Matter: Properties and Changes

Content Area: **Science**
Course(s): **Science Grade 5**
Time Period: **MP1**
Length: **45 days**
Status: **Published**

NJSLS - Science

5-PS1-1	Develop a model to describe that matter is made of particles too small to be seen.
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.
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
5-PS1-3	Make observations and measurements to identify materials based on their properties.
5-PS1-4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Science and Engineering Practices

Developing and Using Models

Use models to describe phenomena. (5-PS1-1)

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. (5-PS1-3)

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, 3-5-ETS1-3)

Using Mathematics and Computational Thinking

Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

Disciplinary Core Ideas

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)

The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)

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)

PS1.B: Chemical Reactions

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

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)

ETS1.B: Developing Possible Solutions

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Cause and Effect

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

Scale, Proportion, and Quantity

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

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

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

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

Rationale and Transfer Goals

In this unit of study, students describe that matter is made of particles too small to be seen by developing a model. The crosscutting concept of scale, proportion, and quantity is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and use these practices to demonstrate understanding of the core ideas. Students will also develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. The crosscutting concepts of cause and effect and scale, proportion, and quantity are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and using mathematics and computational thinking. Students are expected to use these practices to demonstrate an understanding of the core ideas.

Enduring Understandings

Matter is anything that has mass, takes up space, and occurs as a solid, liquid, or gas.

All objects and substances are composed of matter with physical and chemical properties.

Matter can change form or state but will always be conserved.

The physical properties do not change as matter is reduced in size.

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 means other than seeing.

Essential Questions

How can properties be used to identify materials?

What kind of model would best represent/describe matter as made of particles that are too small to be seen?

How can we make slime?

How can baking soda and vinegar burst a zip-lock bag?

Content - What will students know?

- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
- Measurements of a variety of properties can be used to identify materials. (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.)
- Natural objects exist from the very small to the immensely large.
- 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 means other than seeing.
- 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.

- Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- When two or more different substances are mixed, a new substance with different properties may be formed.
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.
- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Note: Mass and weight are not distinguished at this grade level.)
- Science assumes consistent patterns in natural systems.

Skills - What will students be able to do?

- Measure and describe physical quantities such as weight, time, temperature, and volume.
- Make observations and measurements to produce data that can serve as the basis for evidence for an explanation of a phenomenon.
- Make observations and measurements to identify materials based on their properties.
- Develop a model to describe phenomena.
- Develop a model to describe that matter is made of particles too small to be seen. (Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.)
- Identify, test, and use cause-and-effect relationships to explain change.
- Conduct an investigation collaboratively to produce data that can serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials is considered.
- Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
- Measure and describe physical quantities such as weight, time, temperature, and volume.
- Measure and graph quantities such as weight to address scientific and engineering questions and problems.
- Measure and graph quantities to provide evidence that regardless of the type of change that occurs when substances are heated, cooled, or mixed, the total weight is conserved. (Note: Assessment does not include distinguishing between mass and weight.)

Activities - How will we teach the content and skills?

- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 1 Identifying the Properties of Matter
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 2 Mixtures and Solutions
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 3 Physical and Chemical Changes
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 4 Solids, Liquids, and Gases
- 5-PS1-1 Lesson Examples
- 5-PS1-2 Lesson Examples
- 5-PS1-3 Lesson Examples
- 5-PS1-4 Lesson Examples

Formative Assessments

- Inspire Science Labs
- Inspire Science STEM Module Projects
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 3 Lesson Check
- Inspire Science Grade 5 Unit 1 Matter Module: Lesson 4 Lesson Check
- Daily Warm Ups
- Daily Exit Tickets
- Science Journal

Summative Assessments

- Inspire Science STEM Module Projects
- Tests/Quizzes
- Grade 5 Unit 1 Benchmark Assessment

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
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 means other than seeing.	Grade 2: 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 Activities
	Grade 2: Different properties are suited to different purposes.	2-PS1-2 Activities
	Grade 2: A great variety of objects can be built up from a small set of pieces.	2-PS1-3 Activities
		2-PS1-4 Activities
	Grade 2: Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.	

Key Resources

Inspire Science

States of Matter Video

BrainPop States of Matter

CER Writing Graphic Organizer

Time for Slime

Bubble Burst

Flame Out

CER - Claim Evidence Reasoning Written Response

Structure and Properties of Matter-categorizing and classifying matter

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
9.2.5.CAP.1	Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
9.1.5.CR.1	Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
9.4.5.CI.2	Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.
9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).
9.4.5.DC.8	Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 6.3.5.GeoHE.1).
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.
9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.
9.4.5.TL.3	Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

Interdisciplinary Connections

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RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. (5-PS1-1)

W.WR.5.5. Establish a central idea about a topic, investigation, issue or event and use several sources to support the proposed central idea. (5-PS1-2, 5-PS1-3, 5-PS1-4, 3-5-ETS1-3)

W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources. (5-PS1-2, 5- PS1-3, 5-PS1-4, 3-5-ETS1-3)

NJSLS Mathematics

MP.2 Reason abstractly and quantitatively. (5-PS1-1, 3-5-ETS1-3)

MP.4 Model with mathematics. (5-PS1-1, 3-5-ETS1-3)

MP.5 Use appropriate tools strategically. (3-5-ETS1-3)

5.NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-PS1-1)

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)

5.M.B.2 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)

A. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.

B. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

5.M.B.3 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units. (5-PS1- 1)