

How to decode the standards

Title and Code

Two standards at different grade levels may use the same name of they focus on the same topic. The code, however, is a unique identifier for each standard based on the grade level, content area, and topic of the standard.

Performance Expectation

A statement that combines practices, core ideas, and crosscutting concepts into a single statement describing how students can show what they have learned.

Standard

A collection of several performance expectations describing what students should be able to do to master this standard

Scientific & Engineering Practices

Practices are the activities that scientists and engineers engage in to either understand the world or solve a problem

Foundation Box

The practices, core disciplinary ideas, and crosscutting concepts from the *Framework for K-12 Science Education* that were used to form the performance expectations

Disciplinary Core Ideas

Core Ideas are those concepts in science and engineering that have broad importance within and across disciplines as well as relevance in people's lives.

Crosscutting Concepts

Crosscutting Concepts are those ideas, such as *Patterns* and *Cause and Effect*, which are not specific to any one discipline but cut across them all.

Connection Box

Other standards in the *Next Generation Science Standards* or in the *Common Core State Standards* that are related to this standard

MS.PS-1PM Structure and Properties of Matter
 (Students who demonstrate understanding can:)

- Construct and use models to explain that atoms combine to form new substances of varying complexity in terms of the number of atoms and repeating subunits. (Clarification Statement: Examples of atoms combining can include hydrogen (H_2) and oxygen (O_2) combining to form water, and carbon atoms combining to form molecules with one another in various ways, such as diamond, graphite, and buckyballs.)
- Plan investigations to generate evidence supporting the claim that one pure substance can be distinguished from another based on characteristic properties. (Clarification Statement: Properties of substances can include melting and boiling points, density, solubility, reactivity, flammability, and phase.)
- Use a simulation or mechanical model to determine the effect on the temperature and motion of atoms and molecules of different substances when thermal energy is added to or removed from the substance. (Assessment Boundary: Quantification of the effect or use of mathematical formulas are not intended.)
- Construct an argument that explains the effect of adding or removing thermal energy to a pure substance in different phases and during a phase change in terms of atomic and molecular motion. (Assessment Boundary: The use of mathematical formulas is not intended.)

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

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 4-8 builds on K-3 and progresses to developing, using and refining models to explain, explore, and predict more abstract phenomena and design systems. <ul style="list-style-type: none"> Use and/or construct models to predict, explain, and/or collect data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs. Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 4-8 builds on K-3 experiences and progresses to including investigations that use multiple variables and provide evidence to support explanations or design solutions. <ul style="list-style-type: none"> Plan and carry out investigations individually and collaboratively, identifying independent and dependent variables, and controls. Collect data and generate evidence to answer scientific questions or test design solutions (prior to a range of conditions). Engaging in Argument from Evidence Presenting an argument from evidence in 4-8 builds from K-3 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world. <ul style="list-style-type: none"> Use oral and written arguments supported by logical evidence and reasoning to support or refute an explanation for a phenomenon or a solution to a problem. 	PS.1.A: Structure and Properties of Matter <ul style="list-style-type: none"> All substances are made from some 100 different types of atoms. Atoms combine to form molecules with sizes in size from two to thousands of atoms. Pure substances are made from a single type of atom or molecule, with pure substances having characteristic physical and chemical properties (PS, such as density, solubility, boiling points, etc.) that can be used to identify them. Gases and liquids are made of molecules that are constantly moving about relative to each other, with most atoms in a liquid, the molecules are relatively in contact with their nearest neighbors. They are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and vibrate in position but do not change relative positions. Solids may be formed by molecules or they may be extended structures with repeating subunits (e.g., crystals). The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. PS.1.B: Definition of Energy <ul style="list-style-type: none"> The term "heat" as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation (particularly infrared and light). Temperature is not a measure of energy; the relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. 	Patterns Macroscopic patterns are related to the nature of microscopic and atomic-level structure. Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. Patterns can be used to identify cause and effect relationships. Cause and effect charts can be used to identify patterns in data. Cause and Effect Relationships can be broken down into causal or correlational, and correlation does not necessarily imply causation. Cause and effect relationships may be used to predict phenomena in natural or designed systems. Systems may have more than one cause, and some use and effect relationships in systems can only be described using probability. Structure and Function Complex microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on their shapes, compositions, and relationships among its parts, therefore complex parts of designed structures/systems can be analyzed to determine how they function. Structures can be designed to account for particular functions, by taking into account processes of different materials, and how materials can be shaped and used.

Connections to other L.O.s in the grade-level: PS.1.SS-1SP, PS.1.SS-5S, PS.1.SS-1PE
 A list of all L.O.s across grade-levels: 3.SP, 5.SPP, HS.PS.SPP, HS.PS, HS, PS, PE, HS.PS, PE

Common Core State Standards Connections: (Note: these connections will be made more explicit and complete in future draft releases)

ELA—

- W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- W.6.1 Write arguments to support claims with clear reasons and relevant evidence.
- W.7.1 Write arguments to support claims with clear reasons and relevant evidence.
- SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
- SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

WHST.6-8.1 Write arguments focused on discipline-specific content.

RST.6-8.3 Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.

Mathematics—

- MP.1 Model with mathematics.
- MP.8 Look for and express regularity in repeated reasoning.
- 6.SP Develop understanding of statistical variability
- Summarize and describe distributions