Shelby County Schools Science Vision

Shelby County Schools' vision of science education is to ensure that from early childhood to the end of the 12th grade, all students have heightened curiosity and an increased wonder of science; possess sufficient knowledge of science and engineering to engage in discussions; are able to learn and apply scientific and technological information in their everyday lives; and have the skills such as critical thinking, problem solving, and communication to enter careers of their choice, while having access to connections to science, engineering, and technology.

To achieve this, Shelby County Schools has employed The Tennessee Academic Standards for Science to craft meaningful curricula that is innovative and provide a myriad of learning opportunities that extend beyond mastery of basic scientific principles.

Introduction

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination 2025. In order to achieve these ambitious goals, we must collectively work to provide our students with high quality standards aligned instruction. The Tennessee Academic Standards for Science provide a common set of expectations for what students will know and be able to do at the end of each grade, can be located in the Tennessee Science Standards Reference. Tennessee Academic Standards for Science are rooted in the knowledge and skills that students need to succeed in post-secondary study or careers. While the academic standards establish desired learning outcomes, the curricula provides instructional planning designed to help students reach these outcomes. The curriculum maps contain components to ensure that instruction focuses students toward college and career readiness. Educators will use this guide and the standards as a roadmap for curriculum and instruction. The sequence of learning is strategically positioned so that necessary foundational skills are spiraled in order to facilitate student mastery of the standards.

Our collective goal is to ensure our students graduate ready for college and career. Being College and Career Ready entails, many aspects of teaching and learning. We want our students to apply their scientific learning in the classroom and beyond. These valuable experiences include students being facilitators of their own learning through problem solving and thinking critically. The Science and Engineering Practices are valuable tools used by students to engage in understanding how scientific knowledge develops. These practices rest on important "processes and proficiencies" with longstanding importance in science education. The science maps contain components to ensure that instruction focuses students toward understanding how science and engineering can contribute to meeting many of the major challenges that confront society today. The maps are centered around five basic components: the Tennessee Academic Standards for Science, Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts, and Phenomena.

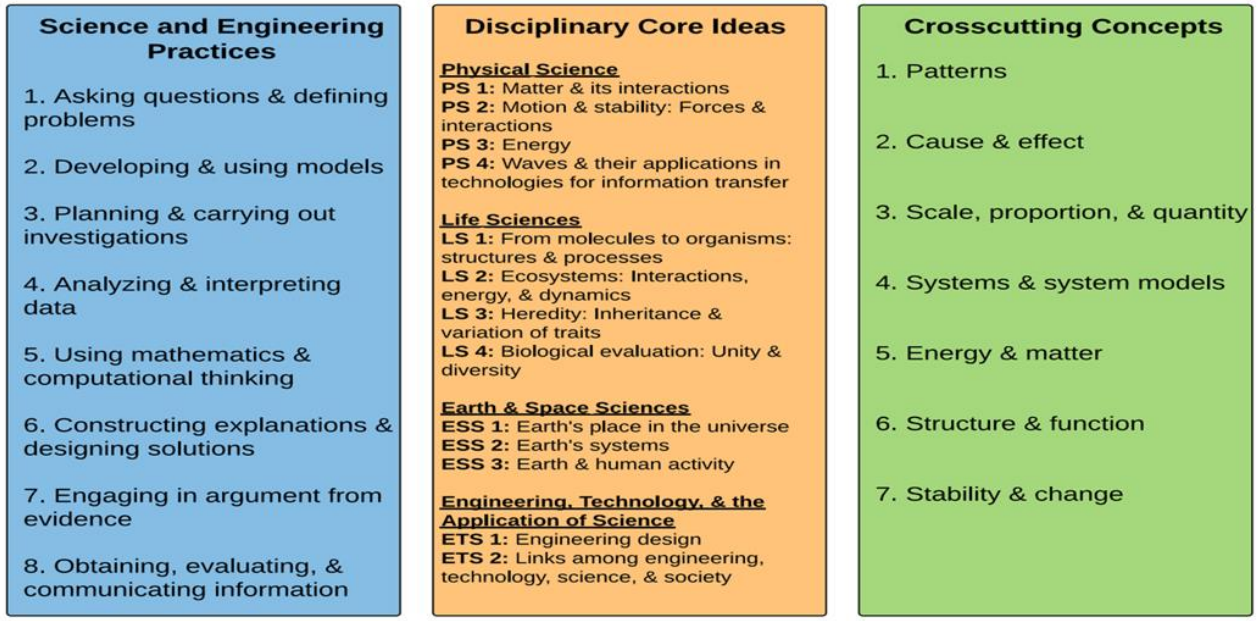
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science classrooms. Thinking about science had become memorizing concepts and solving mathematical formulae. Practicing science had become prescribed lab situations with predetermined outcomes. The framework proposes a three-dimensional approach to science education that capitalizes on a child's natural curiosity. The Science Framework for K-12 Science Education provides the blueprint for developing the effective science practices. The *Framework* expresses a vision in science education that requires students to operate at the nexus of three dimensions of learning: Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The *Framework* identified a small number of disciplinary core ideas that all students should learn with increasing depth and sophistication, from Kindergarten through grade twelve. Key to the vision expressed in the *Framework* is for students to learn these disciplinary core ideas in the context of science and engineering practices. The importance of combining Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas is stated in the *Framework* as follows:

Standards and performance expectations that are aligned to the framework must take into account that students cannot fully understand scientific and engineering ideas without engaging in the practices of inquiry and the discourses by which such ideas are developed and refined. At the same time, they cannot learn or show competence in practices except in the context of specific content. (NRC Framework, 2012, p. 218)

To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they use multiple practices in developing a particular core idea and apply each practice in the context of multiple core ideas. We use the term "practices" instead of a term such as "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Students in grades K-12 should engage in all eight practices over each grade band**.** Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. Crosscutting concepts have value because they provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. There are seven crosscutting concepts that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering. Their purpose is to help students deepen their understanding of the disciplinary core ideas and develop a coherent and scientifically based view of the world.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery.

Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.



Learning Progression

At the end of the elementary science experience, students can observe and measure phenomena using appropriate tools. They are able to organize objects and ideas into broad concepts first by single properties and later by multiple properties. They can create and interpret graphs and models that explain phenomena. Students can keep notebooks to record sequential observations and identify simple patterns. They are able to design and conduct investigations, analyze results, and communicate the results to others. Students will carry their curiosity, interest and enjoyment of the scientific world view, scientific inquiry, and the scientific enterprise into middle school.

At the end of the middle school science experience, students can discover relationships by making observations and by the systematic gathering of data. They can identify relevant evidence and valid arguments. Their focus has shifted from the general to the specific and from the simple to the complex. They use scientific information to make wise decision related to conservation of the natural world. They recognize that there are both negative and positive implications to new technologies.

As an SCS graduate, former students should be literate in science, understand key science ideas, aware that science and technology are interdependent human enterprises with strengths and limitations, familiar with the natural world and recognizes both its diversity and unity, and able to apply scientific knowledge and ways of thinking for individual and social purposes.

Structure of the Standards

- Grade Level/Course Overview: An overview that describes that specific content and themes for each grade level or high school course.
- Disciplinary Core Idea: Scientific and foundational ideas that permeate all grades and connect common themes that bridge scientific disciplines.
- Standard: Statements of what students can do to demonstrate knowledge of the conceptual understanding. Each performance indicator includes a specific science and engineering practice paired with the content knowledge and skills that students should demonstrate to meet the grade level or high school course standards.

Purpose of Science Curriculum Maps

This map is a guide to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the Tennessee Academic Standards for Science, which define what to teach and what students need to learn at each grade level. The map is designed to reinforce the grade/course-specific standards and content (scope) and provides *suggested* sequencing, pacing, time frames, and aligned resources. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)			
Overarching Question(s)			
How can one explain the structure, properties, and interactions of matter?			
Unit 1, Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Introduction to Matter	3 days	What properties define matter?	matter, mass, weight, volume, density
Unit 1, Lessons 1-3 can be combined and taught as background information for Unit 1, Lessons 4-9.			

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
Lesson 1 is designed to provide background knowledge for students before learning standards within Disciplinary Core Idea, PS1: Matter and Its Interactions. Information listed below includes the most closely related standard. This standard will be addressed in Lessons 4 and 5. **DCI(s)** PS1: Matter and Its Interactions **Standard(s)** 7.PS1.6 Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure.	**Learning Outcomes** • Define matter, mass, and weight. • Distinguish between mass and weight. • Describe how to measure the mass and the weight of an object. • Define volume. • Describe how to determine the volume of a rectangular solid and of an irregular shaped object using displacement. • Define density. • Describe how mass, volume, and density are related.	**Curricular Resources** HMH Tennessee Science TE, Unit 1, Lesson 1 pp. 14-29 Engage • Similar but Different Activity, TE p. 16 • Engage Your Brain, SE p. 5 Density • Density Dependent Daily Demo, TE p. 17 Explore Mass and Weight • Mass & Weight Quick Lab, TE p. 16 Volume • Finding Volume by Displacement Quick Lab, TE p. 16

Explanation(s) and Support of Standard(s) from TN Science Reference Guide 7.PS1.6 The state of matter of a substance is dependent on three factors: the intermolecular attractions between the atoms/molecules of the substance, the external pressure on the substance, and the temperature of the substance. Models should account for particles, a vessel containing the particles, the motion (average kinetic energy) of the particles, and the total thermal energy of the system and the interactions between these components. Models can be used to explain why some substances such as hydrogen and helium atoms exist primarily as gasses due to very weak intermolecular attractions. Even very small amounts of motion are capable of overcoming the attractions between molecules. This contrasts with substances such as ionic compounds which have extremely strong intermolecular attractions keeping atoms in a very organized crystal lattice pattern even at high temperatures. Pressure can be seen as an external force from surrounding matter pushing the particles closer together. Students should attribute pressure to the vessel containing the sample. It is logical to incorporate triple point diagrams into discussions.	**Suggested Phenomenon**  The density column displayed in the picture provides a visual for how the diversity of matter affects interactions between different materials. Whether an object sinks or floats depends on its density compared with the density of the liquid into which it is dropped. All types of matter—solids as well as liquids—are made up of many different atoms. Depending on the mass of these atoms, their size and the way they are arranged, different substances will have different densities. The density is characteristic for each individual compound and defined as the mass of a compound divided by its volume. In other words, the more matter there is in a certain amount of volume, the denser a substance is. Click on the picture to see how the density column was assembled. Students can complete a See Think	Explain Matter • Active Reading #5, SE p. 6 • Visualize It! #6, SE p. 6 Mass and Weight • Active Reading #7, SE p. 7 • Visualize It! #8, SE p. 8 Volume • Active Reading #9, SE p. 9 • Think Outside the Book #10, SE p. 9 Density • Active Reading #13, SE p. 13 • Predict #14, SE p. 13 Extend Reinforce and Review • Visual Summary, SE p. 16 Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 16 Summative Assessment • Reteach, TE p. 21 • Mass, Volume, and Density Alternative Assessment, TE p. 21 • Lesson Quiz **Additional Resources** • Properties of Matter STUDY JAMS! Video • Introduction to Matter cK-12 Article

Students should use models to connect how changes in pressure impact the change in thermal energy that is required for phase transformations to occur. (Students are not expected to differentiate between the types of intermolecular attractions, merely to recognize that some force must be holding together the particles in a solid, and that overcoming this force causes a phase change.) **Suggested Science and Engineering Practice(s)** Developing and Using Models 7.PS1.6 Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models. **Suggested Crosscutting Concept(s)** Cause and Effect 7.PS1.6 Students begin to connect their explanations for cause and effect relationships to specific scientific theory.	Wonder Template after examining the picture or viewing the video.	**ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science Sample Language Objectives: (these address a language domain and provide a scaffold for ELs.) • Students will write a definition of matter, mass, and weight using sentence frames. • Students will use compare and contrast vocabulary to distinguish between mass and weight. • Students will use a step sheet to write how to measure the mass and the weight of an object. When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Pre teach the vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) object, density, matter, envelope, lift off Interactive Science Dictionary with visuals Model speaking and writing expectations for Entering Level ELs. Consider using the

		recommended stems to support students in their discussions and writing. To support describing and defining matter- use the following sentence frames: (Define) A is . (Classify) A is a kind of… . (Describe) A is . To support describing changes in: I noticed that…. In the beginning the _____was_____. After_____, it changed by_____. Use graphic organizers or concept maps to support students in their analysis of types of intermolecular attractions. Use relationship verbs such as contain, consist of. as, then. When I changed, then happened. The more/less, then. <u>States of matter visuals</u> To support students with the scientific explanation: <u>Question Starters</u> What's the connection between….? What link do you see between… Why do you think…?

		What is our evidence that…. Do we have enough evidence to make that claim? But what about this other evidence that shows…? But does your claim account for…(evidence) <u>Response Starters:</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that… Your explanation makes me think about ….. Compare and contrast sentence starters: • The difference between... • There are similarities between...

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1, Lesson 2	Lesson Length	Essential Question	Vocabulary
Properties of Matter	2 days	What are physical and chemical properties of matter?	physical property chemical property

Unit 1, Lessons 1-3 can be combined and taught as background information for Unit 1, Lessons 4-9.

Standards and Related Background Information	Instructional Focus	Instructional Resources
Lesson 2 is designed to provide background knowledge for students before learning standards within Disciplinary Core Idea, PS1: Matter and Its Interactions. Information listed below includes the most closely related standard. This standard will be addressed in Lessons 7 and 8. **DCI(s)** PS1: Matter and Its Interactions	**Learning Outcomes** • Describe physical and chemical properties of matter. • Explain how to distinguish physical properties from chemical properties. • Describe characteristic properties of matter. • Explain how to use characteristic properties to identify substances.	**Curricular Resources** HMH Tennessee Science TE, Unit 1, Lesson 2 pp. 32-47 Engage • Describe It Activity, TE p. 34 • Engage Your Brain #s 1 and 2, SE p. 21 Explore Physical Properties • Observe Physical Properties Quick Lab, TE p. 35 Using Properties to Identify Unknown Substances • A Rockin' Reaction Daily Demo, TE p. 35

Standard(s)
7.PS1.5 Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

Explanation(s) and Support of Standard(s) from TN Science Reference Guide
7.PS1.5 Unlike properties such as atomic radii and electronegativity, the chemical and physical properties, referenced in this standard include bulk properties of matter. Bulk properties are only observable in a sample of a substance (element or compound) comprised of multiple particles, and are a result of the way that the particles interact with each other. Examples might include density, melting points, boiling point, solubility, flammability, color, or conductivity.

Whenever possible, connections in the behaviors of atoms should be connected back to the organization of the periodic table.

It is not necessary for students to explain the mechanisms (inter-molecular attractions) that cause the patterns in physical properties.

Suggested Science and Engineering Practice(s)
Analyzing and Interpreting Data 7.PS1.5
Students should create and analyze tables of data to identify relationships, consider statistical features

Suggested Phenomenon

The density column displayed in the picture provides a visual for how the diversity of matter affects interactions between different materials. Whether an object sinks or floats depends on its density compared with the density of the liquid into which it is dropped. All types of matter—solids as well as liquids—are made up of many different atoms. Depending on the mass of these atoms, their size and the way they are arranged, different substances will have different densities. The density is characteristic for each individual compound and defined as the mass of a compound divided by its volume. In other words, the more matter there is in a certain amount of volume, the denser a substance is. Click on the picture to see how the density column was assembled. Students can complete a See Think Wonder Template after examining the picture or viewing the video.

Explain
Physical Properties
- Active Reading #5, SE p. 23
- Visualize It! #6, SE p. 23
- Think Outside the Book #7, SE p. 23
- Visualize It! #s 8-10, pp. SE 24-25
- Inquiry #11, p. SE 25

Chemical Properties
- Active Reading #12, SE p. 26
- Predict #13, SE p. 26

Comparing Physical and Chemical Properties
- Active Reading #14, SE p. 28
- Visualize It! #s15-16, SE p. 28

Using Properties to Identify Unknown Substances
- Infer #20, SE p. 30

Extend
- At the Scene #s17-19, SE p. 29

Reinforce and Review
- Visual Summary, SE p. 32

Evaluate
Formative Assessment
- Throughout TE
- Lesson Review, SE p. 33

Summative Assessment
- Reteach, TE p. 39
- Identifying Physical and Chemical Properties, TE p. 39
- Lesson Quiz

within data and evaluate multiple data sets for a single phenomenon. **Suggested Crosscutting Concept(s)** Patterns 7.PS1.5 Students recognize, classify, and record patterns in data, graphs, and charts.		**Additional Resources** Properties of Matter STUDY JAMS! Video **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science Sample Language Objectives: (these address a language domain and provide a scaffold for ELs.) • Students will use simple sentence frames and word boxes to describe physical and chemical properties of matter. • Students will talk with a partner to explain how to distinguish physical properties from chemical properties using a graphic organizer When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Pre-teach the vocabulary**:** (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) object, density, matter, envelope, lift off Interactive Science Dictionary with visuals

		Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. To support defining - use the following sentence frames: (Define) A is . (Classify) A is a kind of… . (Describe) A is . Use relationship verbs such as contain, consist of. as, then. When I changed, then happened. The more/less, then. <u>Question Starters</u> What's the connection between….? What link do you see between… Why do you think…? What is our evidence that…. Do we have enough evidence to make that claim? But what about this other evidence that shows.? But does your claim account for…(evidence) <u>Response Starters</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that…

		Your explanation makes me think about ….. Compare and contrast sentence starters: • The difference between... • There are similarities between...

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
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Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)			
Overarching Question(s)			
How can one explain the structure, properties, and interactions of matter?			
Unit 1, Lesson 3	**Lesson Length**	**Essential Question**	**Vocabulary**
Physical and Chemical Changes	2 days	What are physical and chemical changes of matter?	physical change chemical change law of conservation of mass
Unit 1, Lessons 1-3 can be combined and taught as background information for Unit 1, Lessons 4-9.			
Standards and Related Background Information		**Instructional Focus**	**Instructional Resources**
Lesson 3 is designed to provide background knowledge for students before learning standards within Disciplinary Core Idea, PS1: Matter and Its Interactions. Information listed below includes the most closely related standard. This standard will be addressed in Lesson 9. **DCI(s)** PS1: Matter and Its Interactions		**Learning Outcomes** • Describe physical and chemical changes of matter. • Describe how temperature influences chemical changes. • Differentiate between physical changes and chemical changes. • Explain how to identify signs of chemical changes of matter. • Describe the Law of Conservation of Mass in relation physical and chemical changes.	**Curricular Resources** HMH Tennessee Science, Unit 1, Lesson 3 pp. 48-61 Engage • What's New? Discussion, TE p. 50 • Engage Your Brain, SE p. 35 Explore Chemical Change • Properties of Combined Substances, TE p. 50 Comparing Physical and Chemical Changes • Physical or Chemical Change? Quick Lab, TE p. 51

Standard(s) 7.PS1.4 Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants and products support the Law of Conservation of Mass. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.PS1.4 Analysis could include either analysis of models of a reaction, or analysis of data collected during a reaction. The purpose of the analysis is to gather evidence that the mass of the reacting substances does not change, although their form may. Balancing a chemical reaction is beyond the scope of this standard. Models might include written chemical reactions, but should also be supplemented with physical models such as molecular sets that can be assembled, disassembled, and reassembled to demonstrate that rearrangement of atoms which occurs in a chemical reaction. Analysis should include conceptually recognizing that the conservation of mass only occurs because the mass (total number of protons and neutrons per atom (7.PS1.1)) of each atom in the reactants does not change. Discussions of moles and molar masses are beyond the scope of the grade band.	**Suggested Phenomenon**  The reason why popcorn pops is the water trapped inside its kernel. If the kernel is heated to a high enough temperature, this water will transform into steam, a physical change. Due to the hard and mostly nonporous shell, the steam has nowhere to go, resulting in a buildup of pressure inside the kernel. Once the pressure gets high enough and the temperature reaches about 180 degrees Celsius (355 degrees Fahrenheit), the kernel hull bursts and the popcorn is turned inside out. Click on the picture above to see popcorn popping in slow motion. Students can complete a See Think Wonder Template while watching the video.	Law of Conservation of Mass • Mass Doesn't Change Daily Demo, TE p. 51 Explain Physical Change • Active Reading #5, SE p. 36 • Identify #6, SE p. 37 • Visualize It! #7, SE p. 37 Chemical Change • Visualize It! #8, SE p. 38 • Active Reading #9, SE p. 39 • Think Outside the Book #10, SE p. 39 Comparing Physical and Chemical Changes • Active Reading #11, SE p. 40 • Infer #12, SE p. 41 Law of Conservation of Mass • Active Reading #13, SE p. 42 • Visualize It! #s 14 and 15, SE p. 43 Extend Reinforce and Review • Changes in Matter Activity, TE p. 54 • Visual Summary, SE p. 44 Going Further • Technology Connection, TE p. 54 Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 45 Summative Assessment • Reteach, TE p. 55

Suggested Science and Engineering Practice(s) Analyzing and Interpreting Data 7.PS1.4 Students should create and analyze tables of data to identify relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon. **Suggested Crosscutting Concept(s)** Energy and Matter 7.PS1.4 Students demonstrate conservation of mass in physical and chemical changes.		• What a Change! Alternative Assessment, TE p. 55 • Lesson Quiz **Additional Resources** • Physical and Chemical Changes of Matter STUDY JAMS! Video • Changes in Matter cK-12 Lesson **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science Sample Language Objective (these address a language domain and provide a scaffold for ELs.) • Students will talk with a partner to describe physical and chemical changes of matter using a sentence frame. • Students will write to describe how temperature influences chemical changes using a graphic organizer. Pre-teach vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) compound, influence(s), matter, signs, react/reaction

		Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. Use graphic organizers or concept maps to support students in their descriptions of how temperature influences chemical/physical changes. Provide compare/contrast sentence stems: This is the same as because . This is different than because . All these are because . , and all have/are . When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals To support students with the scientific explanation: Question Starters What's the connection between….? What link do you see between… Why do you think…? What is our evidence that…. Do we have enough evidence to make that claim? But what about this other evidence that shows…?

		But does your claim account for…(evidence) <u>Response Starters</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that… Your explanation makes me think about …..

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UNIT 1: Interactions of Matter (8 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1, Lesson 4	Lesson Length	Essential Question	Vocabulary
States of Matter	3 days	How do particles in solids, liquids, and gases move?	solid, liquid, gas

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.6 Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.PS1.6 The state of matter of a substance is dependent on three factors: the intermolecular attractions between the atoms/molecules of the	**Learning Outcomes** • Explain how the particles (atoms and molecules) that make up matter are constantly in motion. • Describe the motion of particles in solids, liquids, and gases. • Explain how movement of particles (atoms and molecules) in solids, liquids, and gases affect the properties of solids, liquids, and gases.	**Curricular Resources** HMH Tennessee Science TE, pp. 82-94 Engage • Engage Your Brain, SE p. 65 • Active Reading #s 3 and 4, SE p. 65 Particles in Motion • Modeling Particle Motion Activity, TE p. 84 • How Far Apart Are They? Activity, TE p. 84 Properties of Solids, Liquids, and Gases • Properties of Matter Daily Demo, TE p. 85 Explore Properties of Solids, Liquids, and Gases • Can Crusher Quick Lab, TE p. 84 • Changing Volumes Quick Lab, TE p. 85

substance, the external pressure on the substance, and the temperature of the substance. Models should account for particles, a vessel containing the particles, the motion (average kinetic energy) of the particles, and the total thermal energy of the system and the interactions between these components. Models can be used to explain why some substances such as hydrogen and helium atoms exist primarily as gasses due to very weak intermolecular attractions. Even very small amounts of motion are capable of overcoming the attractions between molecules. This contrasts with substances such as ionic compounds which have extremely strong intermolecular attractions keeping atoms in a very organized crystal lattice pattern even at high temperatures. Pressure can be seen as an external force from surrounding matter pushing the particles closer together. Students should attribute pressure to the vessel containing the sample. It is logical to incorporate triple point diagrams into discussions. Students should use models to connect how changes in pressure impact the change in thermal energy that is required for phase transformations to occur. (Students are not expected to differentiate between the types of intermolecular attractions, merely to	**Suggested Phenomena**  Firefighters hose down a fire inside a three-story building, but because of below zero temperatures the building turns to ice. Students can complete a See Think Wonder Template after examining the picture or viewing the video.	Explain Particles in Motion • Describe #5, SE p. 66 • Describe #6, SE p. 67 • Describe #7, SE p. 67 Properties of Solids, Liquids, and Gases • Active Reading #8, SE p. 68 • Think Outside the Book #9, SE p. 68 • Visualize It! #10, SE p. 69 • Apply #11, SE p. 70 Extend Making Glass #s 12-14, SE p. 71 Reinforce and Review • Name That Matter Activity, TE p. 88 • Visual Summary, SE p. 72 Going Further • Engineering Connection, TE p. 88 • Chemistry Connection, TE p. 88 Evaluate Formative Assessment • Reteach, TE p. 89 • Throughout TE • Lesson Review, SE p. 73 Summative Assessment • States of Matter Assessment, TE p. 89 • Lesson Quiz

recognize that some force must be holding together the particles in a solid, and that overcoming this force causes a phase change.)

Suggested Science and Engineering Practice(s)
Developing and Using Models 7.PS1.6
Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.

Suggested Crosscutting Concept(s)
Cause and Effect 7.PS1.6
Students begin to connect their explanations for cause and effect relationships to specific scientific theory.

"Ice Palace" Chicago 2013
As firefighters try to extinguish a fire, the building turns to ice due to the temperature. Students can complete a See Think Wonder Template after examining the picture or viewing the video.

Additional Resources
- States of Matter: Basics PhET Interactive Simulations
- Legends of Learning-Gases and Liquids
- Legends of Learning-States of Matter and their Structure

ESL Supports and Scaffolds
WIDA Standard 4 - The Language of Science

To support students in speaking, refer to this resource:

WIDA Doing and Talking Science

Sample Language Objective (these address a language domain and provide a scaffold for ELs.)
- Students will use a concept map to write to explain how the particles (atoms and molecules) that make up matter are constantly in motion.
- Students will talk with a partner to describe the motion of particles in solids, liquids, and gases using describing sentence frames.

When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates

Interactive Science Dictionary with visuals

		Pre-teach vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) motion, substance, constant, state of To support students with the scientific explanation: Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. Provide compare/contrast sentence stems: This is the same as, because. This is different than, because. All these are because . , and all have/are . <u>Question Starters</u> What's the connection between….? What link do you see between… Why do you think…? What is our evidence that…. Do we have enough evidence to make that claim? But what about this other evidence that shows…? But does your claim account for…(evidence) <u>Response Starters</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning)

		This evidence shows that… Your explanation makes me think about …..

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)			
Overarching Question(s)			
How can one explain the structure, properties, and interactions of matter?			
Unit 1, Lesson 5	**Lesson Length**	**Essential Question**	**Vocabulary**
Changes of State	2 days	What happens when matter changes state?	freezing, boiling, sublimation, melting, condensation, deposition, evaporation

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.6 Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.PS1.6 The state of matter of a substance is dependent on three factors: the intermolecular attractions between the atoms/molecules of the	**Learning Outcomes** • Explain how the particles (atoms and molecules) that make up matter are constantly in motion. • Describe the motion of particles in solids, liquids, and gases. • Explain how movement of particles (atoms and molecules) in solids, liquids, and gases affect the properties of solids, liquids, and gases.	**Curricular Resources** HMH Tennessee Science TE, Unit 1, Lesson 6 pp. 96-115 Engage • Moving Particles Activity, TE p. 98 • Engage Your Brain #s 1 and 2, SE p. 75 • Active Reading #s 3 and 4, SE p. 75 Changes Between Solid, Liquid, and Gas States • Evaporation and Condensation Daily Demo, TE p. 98 • Boiling Water Without Heating It Quick Lab, TE p. 99 Explore Changes in States of Matter

substance, the external pressure on the substance, and the temperature of the substance. Models should account for particles, a vessel containing the particles, the motion (average kinetic energy) of the particles, and the total thermal energy of the system and the interactions between these components. Models can be used to explain why some substances such as hydrogen and helium atoms exist primarily as gasses due to very weak intermolecular attractions. Even very small amounts of motion are capable of overcoming the attractions between molecules. This contrasts with substances such as ionic compounds which have extremely strong intermolecular attractions keeping atoms in a very organized crystal lattice pattern even at high temperatures. Pressure can be seen as an external force from surrounding matter pushing the particles closer together. Students should attribute pressure to the vessel containing the sample. It is logical to incorporate triple point diagrams into discussions. Students should use models to connect how changes in pressure impact the change in thermal energy that is required for phase transformations to occur. (Students are not expected to differentiate between the types of intermolecular attractions, merely to	**Suggested Phenomena**  Firefighters hose down a fire inside a three-story building, but because of below zero temperatures the building turns to ice. Students can complete a See Think Wonder Template after examining the picture or viewing the video.	• Modeling Particle Motion Quick Lab, TE p. 99 • Changes of State Exploration Lab, TE p. 99 • Change of Pace Virtual Lab, TE p. 99 Explain Changes in States of Matter • Identify #5, SE p. 76 • Visualize It! #6, SE p. 76 • Visualize It! #s 7 and 8, SE p. 77 Changes Between Solid, Liquid, and Gas States • Evaporation and Condensation Daily Demo, TE p. 98 • Predict #9, SE p. 78 • Visualize It! #10, SE p. 78 • Active Reading #11, SE p. 78 • Model #12, SE p. 79 • Infer #13, SE p. 79 • Predict #14, SE p. 80 • Identify #15, SE p. 80 • Apply #16, SE p. 81 • Visualize It! #17, SE p. 81 • Think Outside the Book #18, SE p. 82 • Active Reading #19, SE p. 83 • Relate #20, SE p. 83 Conservation of Mass During Changes of State • Active Reading #21, SE p. 84 • Visualize It! #s 22-24, SE pp. 84-85 Extend Reinforce and Review • We Are Particles Activity, TE p. 102

recognize that some force must be holding together the particles in a solid, and that overcoming this force causes a phase change.)

Suggested Science and Engineering Practice(s)
Developing and Using Models 7.PS1.6
Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.

Suggested Crosscutting Concept(s)
Cause and Effect 7.PS1.6
Students begin to connect their explanations for cause and effect relationships to specific scientific theory.

"Ice Palace" Chicago 2013
As firefighters try to extinguish a fire, the building turns to ice due to the temperature. Students can complete a See Think Wonder Template after examining the picture or viewing the video.

- Concept Map Graphic Organizer, TE p. 102
- Visual Summary, SE p. 86

Evaluate
Formative Assessment
- Reteach, TE p. 103
- Throughout TE
- Lesson Review, SE p. 87

Summative Assessment
- States of Mind Alternative Assessment, TE p. 103
- Lesson Quiz
- Unit 1 Connect Essential Questions, SE p. 88
- Unit 1 Think Outside the Book, SE p. 88
- Unit 1 Review, SE p. 89-94

Additional Resources
- States of Matter: Basics PhET Interactive Simulations
- Solids, Liquids, Gases STUDY JAMS! Video
- Changes of State American Chemical Society Lesson Plans
- Legends of Learning-Effects of Temperature and Pressure on State

ESL Supports and Scaffolds
WIDA Standard 4 - The Language of Science
To support students in speaking, refer to this resource:
WIDA Doing and Talking Science

		Sample Language Objective (these address a language domain and provide a scaffold for ELs.) • Students will verbally explain what happens when a substance gains or loses energy using pre-selected vocabulary and a sentence frame. • Use a step sheet to write to explain melting and freezing. When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. Explain sentence stems: Use relationship verbs such as contain, consist of. As , then . When ____ changed , then happened. The more/less , then . Steps sentence stems: At first, , but now…… We saw that first------, then--------- , and finally .

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

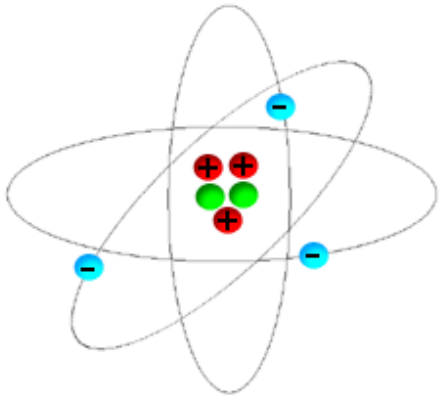
UNIT 1: Interactions of Matter (8 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1, Lesson 6	Lesson Length	Essential Question	Vocabulary
The Atom	3 days	How do we know what parts make up an atom?	matter, atom, electron, neutron, proton, nucleus, electron cloud, atomic number, mass number

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.1 Develop and use models to illustrate the structure of atoms, including the subatomic particles with their relative positions and charge. **Explanation and Support of Standard(s) from TN Science Reference Guide** 7.PS1.1 Models should include a nucleus containing positively charged protons and neutrons without charge. Students should recognize that electrons are located outside of the nucleus, but are not	**Learning Outcomes** • Describe the way in which atoms make up matter. • Describe scientific contributions to the atomic theory. • Describe the current model of the atom. • Describe the location, charge, and relative mass of protons, neutrons, and electrons in an atom. • Identify the nucleus and electron cloud in a model of an atom. • Determine the atomic number and mass of an atom.	**Curricular Resources** HMH Tennessee Science, TE Unit 2, Lesson 1 pp. 126-139 Engage • Photographic Dots Activity, TE p. 128 • Engage Your Brain #s 1-2, SE p. 99 • Active Reading #s 3-4, SE p. 99 Explore Parts of the Atom How Are Atoms Structured? Virtual Lab, TE p. 129 Explain The Atom • Active Reading #5, SE p. 100 • Visualize It! #6, SE p. 100

responsible for creating models for the distribution of all electrons, nor are they expected to list full configurations for electrons. These ideas may still be desirable to lead students to an understanding of valence electrons. Students should see the relationship between the number of valence electrons possessed by an element and its location on the periodic table. Student should connect the components of their models (protons, neutrons, electrons) to arrangement of the periodic table. Models including locations and charges of subatomic particles are sufficient to explain relative sizes of atoms (the force of protons on electrons). These same discussions of atomic radius can extend into the general electronegativity trends, arising from repulsion of electrons as they are condensed in smaller radii. The idea of high electronegativity combining with low electronegativity will support patterns observable in way elements combine on the periodic table (7.PS1.5). (Discussions of valence electrons should be limited to elements with only one common oxidation state, and only those with valence electrons in S and P orbitals.)	**Suggested Phenomenon**  Click on the picture to display the animation. All matter is formed from basic building blocks called atoms. Atoms are made of even smaller particles called protons, electrons, and neutrons. Protons and neutrons live in the nucleus of an atom and are almost identical in mass. However, protons have positive charges whereas neutrons have no charge. Electrons have a negative charge and orbit the nucleus in shells or electron orbitals and are much less massive than the other particles. Students can complete a See Think Wonder Template after examining the picture and/or animation.	Development of the Atomic Theory • Active Reading #7, SE p. 102 • Model #8, SE p. 102 • Analyze #9, SE p. 103 Parts of the Atom • Active Reading #10, SE p. 104 • Summarize #11, SE p. 105 • Modeling Atomic Nucleus Daily Demo, TE p. 128 • Active Reading #12, SE p. 106 • Think Outside the Book #s 13 and 14, SE p. 106 • Calculate #15, SE p. 107 <u>Extend</u> Reinforce and Review • Atomic Role-Playing, TE p. 132 • Visual Summary, SE p. 108 Going Further • Technology Connection, TE p. 132 <u>Evaluate</u> Formative Assessment • Throughout TE • Lesson Review, SE p. 109 • Reteach, TE p. 133 Summative Assessment • Atomic Activities Alternative Assessment, TE p. 133 • Lesson Quiz

Suggested Science and Engineering Practice(s) Developing and Using Models 7.PS1.1 Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models. **Suggested Crosscutting Concept(s)** Scale, Proportion, and Quantity 7.PS1.1 Students develop models to investigate scales that are beyond normal experiences.		**Additional Resources** • Atomic Structure Simulation • PhET Build an Atom Interactive Simulations • Atoms: Protons, Neutrons, Electrons STUDY JAMS! Video • 7.PS1.1 Student Activity and Teacher Guide • Legends of Learning-Atoms and Elements • Cooking Up Atoms Investigation Better Lesson • Matter and Energy: What Are Atoms? Newsela Article • How to Reveal Subatomic Particles at Home Video **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Sample Language Objective (these address a language domain and provide a scaffold for ELs.) • Students will verbally describe the way in which atoms make up matter to a partner.

		• Students will write to describe scientific contributions to the atomic theory from a text they read with a partner. <u>Simplified language for the atomic theory</u> Pre-teach the vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) contribution, theory, particle, negative, positive

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1, Lesson 7	Lesson Length	Essential Question	Vocabulary
The Periodic Table	1.5 weeks	How are elements arranged on the periodic table?	periodic table, chemical symbol, average atomic mass, metalloid, metal, group, nonmetal, period

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.5 Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.PS1.5 Unlike properties such as atomic radii and electronegativity, the chemical and physical properties, referenced in this standard include bulk properties of matter. Bulk properties are only	**Learning Outcomes** • Identify the atomic number, chemical symbol, name, and average atomic mass of an element on the periodic table. • Compare and contrast the properties of metals, nonmetals, and metalloids • Describe the arrangement of elements in groups and periods on the periodic table.	**Curricular Resources** HMH Tennessee Science, TE Unit 2, Lesson 2 pp. 140-153 Engage • Elementary Learning Activity, TE p. 142 • Engage Your Brain #s 1-2, SE p. 111 • Active Reading #s 3-4, SE p. 111 Explore Information on the Periodic Table • Recognizing Patterns Quick Lab, TE p. 143 The Arrangement of Elements in the Periodic Table • What Trends Can You See in the Periodic Table Virtual Lab, TE p. 143

observable in a sample of a substance (element or compound) comprised of multiple particles, and are a result of the way that the particles interact with each other. Examples might include density, melting points, boiling point, solubility, flammability, or color, conductivity.

Whenever possible, connections in the behaviors of atoms should be connected back to the organization of the periodic table.

It is not necessary for students to explain the mechanisms (inter-molecular attractions) that cause the patterns in physical properties.

Suggested Science and Engineering Practice(s)
Analyzing and Interpreting Data 7.PS1.5
Students should create and analyze tables of data to identify relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon.

Suggested Crosscutting Concept(s)
Patterns 7.PS1.5
Students recognize, classify, and record patterns in data, graphs, and charts.

Suggested Phenomena

Lithium, sodium, and potassium (alkali metals) are placed in different beakers of water to show how the chemical reactions tend to get more violent as we move down the first column of the periodic table. A trend is noticed as we move in a certain direction on the periodic table, properties tend to increase or decrease. Click on the picture to play the video. Students can complete a See Think Wonder Template after viewing the video.

Explain
Information on the Periodic Table
- Visualize It! #5, SE p. 112
- Active Reading #6, SE p. 113
- Apply #7, SE p. 113
- Visualize It! #s 8-9, SE p. 115
- Analyze #10, SE p. 116
- Apply #11, SE p. 116

The Arrangement of Elements in the Periodic Table
- Identify #12, SE p. 117
- Active Reading #13, SE p. 118
- Think Outside the Book #14, SE p. 119
- Analyze #15, SE p. 119
- Analyze #16, SE p. 119

Extend
Reinforce and Review
- Concept Map Graphic Organizer, TE p. 46
- Visual Summary, SE p. 120

Going Further
- Biology Connection, TE p. 146

Evaluate
Formative Assessment
- Reteach, TE p. 147
- Throughout TE
- Lesson Review, SE p. 121

Summative Assessment
- The Periodic Table Alternative Assessment, TE p. 147

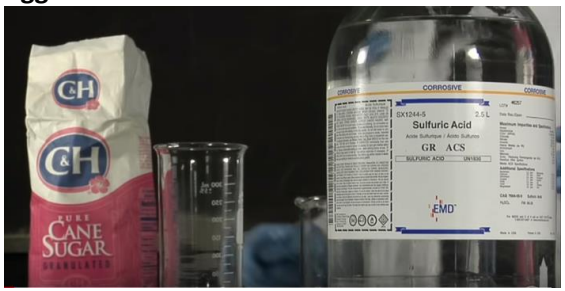
	 Fireworks rely on the chemical characteristics of the elements that are used to make them. The properties of elements react with others to display the beautiful colors that we see. Click on the picture to play the video. Students can complete a See Think Wonder Template after viewing the video.	• Lesson Quiz **Additional Resources** • Periodic Table STUDY JAMS! Video • The Periodic Table: A Classic Design **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Sample Language Objective (these address a language domain and provide a scaffold for ELs.) • Students will identify the atomic number, chemical symbol, name, and average atomic mass of an element on the periodic table by working with a partner and labels. • Students will use a graphic organizer to compare and contrast the properties of metals, nonmetals, and metalloids in writing using a word box.

		Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. To support describing and defining matter - use the following sentence frames: (Define) A is . (Classify) A is a kind of… . (Describe) A is .

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
Quarter 1		Quarter 2		Quarter 3	Quarter 4	
Structures & Routines	**Unit 1 Matter**	Unit 2 Cell Structure and Function	Unit 3 Human Body Systems	Unit 4 Reproduction, Survival, and Heredity	Unit 5 Cycling of Matter and Energy	Unit 6 Earth's Atmosphere
1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (9 weeks)			
Overarching Question(s)			
How can one explain the structure, properties, and interactions of matter?			
Unit 1, Lesson 8	**Lesson Length**	**Essential Question**	**Vocabulary**
Pure Substances and Mixtures	2 weeks	How do pure substances and mixtures compare?	atom, element, compound, mixture, pure substance, heterogeneous, homogeneous

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.2 Compare and contrast elemental molecules and compound molecules. 7.PS1.3 Classify matter as pure substances or mixtures based on composition. *7.PS1.5 Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.*	**Learning Outcomes** • Describe different ways in which the particles that make up matter can combine to form various substances. • Classify elements and compounds as two types of pure substances. • Describe and classify examples of common elements and compounds. • Compare homogeneous mixtures and heterogeneous mixtures. • Classify mixtures as solutions, colloids, and suspensions	**Curricular Resources** HMH Tennessee Science TE, Unit 1, Lesson 4 pp. 66-81 Engage • Edible Mixtures Discussion, TE p. 68 • Engage Your Brain, SE p. 51 • Active Reading #3, SE p. 51 Pure Substances: Elements and Compounds • Modeling Pure Substances Daily Demo, TE p. 69 Explore Pure Substances: Elements and Compounds • Identifying Elements and Compounds Quick Lab, TE p. 69

Explanation(s) and Support of Standard(s) [from TN Science Reference Guide]	Suggested Phenomenon	
7.PS1.2 The word "molecule" is often over-generalized to describe a single particle of any compound. Only some substances (either elements or compounds) exhibit molecular behavior, and only those substances are referred to as molecules. Examples of molecular behaviors include low melting and boiling points, poor conductivity, and pliability. The atoms bonded in a molecule are connected internally by a sharing of electrons. Molecular compounds are also described as covalent compounds because of this behavior. Students should see that some single elements exist in a molecular form, with more than one atom bonded together in a pure form. The noble gases also exhibit molecular behavior, but in a monoatomic form. Students should also be able to differentiate between molecules of a diatomic element and compound molecules. 7.PS1.3 Pure substances have a single chemical composition and a single set of physical and chemical properties. These chemical and properties can be used to identify a pure substance (7.PS1.5). When a pair of pure substances are mixed, one of two outcomes is possible: the two substances do not interact, and the outcome is a mixture, or the two	 When pure cane sugar (white solid compound) is mixed with sulfuric acid (colorless liquid compound), a black mixture is formed. So how is it sulfuric acid turns sugar black? Click on the picture above to see the reaction, play the video for students without sound. Students can complete a See Think Wonder Template after viewing the video.	Explain How Particles Combine • Active Reading #5, SE p. 52 • Think Outside the Book #6, SE p. 52 • Visualize It! #7, SE p. 53 • Classifying Matter Activity, TE p. 68 Pure Substances: Elements and Compounds • Compare #8, SE p. 54 • Active Reading #9, SE p. 55 • Visualize It! Identify #10, SE p. 55 • Visualize It! Explain #11, SE p. 55 • Active Reading #12, SE p. 56 • Visualize It! #13, SE p. 57 Mixtures • Visualize It! #14, SE p. 58 • Active Reading #15, SE p. 59 • Active Reading #16, SE p. 60 • Classify #17, SE p. 61 Extend Reinforce and Review • Thrown into the Mix Activity, TE p. 72 • Synthesizing Key Topics Graphic Organizer, TE p. 72 • Visual Summary, SE p. 62 Going Further • Earth Science Connection, TE p. 72 • Mathematics Connection, TE p. 72 Evaluate Formative Assessment

substances do interact, resulting in a new substance with new physical properties. In a mixture, each of the components of the mixture will retain its physical properties. This allows for separation of mixtures based on physical properties. Students should track physical properties use physical properties to substantiate the classification of a substance. For example, if water and alcohol are combined, the resulting substance will have two boiling points: the boiling point of the alcohol (~70oC) and the boiling point of the water (100oC). If the two had combined, the resulting substance would have a single boiling point. For purposes of this standard, it is reasonable to assume that if two substances do combine, they do so completely, resulting in a new pure substance without contaminants **Suggested Science and Engineering Practice(s)** Developing and Using Models 7.PS1.2 Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.		• Reteach, TE p. 73 • Throughout TE • Lesson Review, SE p. 73 Summative Assessment • Matter Menu Alternative Assessment, TE p. 73 • Lesson Quiz **Additional Resources** • Mixtures STUDY JAMS! Video • Elements & Compounds STUDY JAMS! Video • Build a Molecule PhET Interactive Simulations • 7.PS1.3 Student Activity, Card Sort, Engagement, Reading Support, Testing Questions, and Teacher Guide • Legends of Learning- Molecules and Compounds • Legends of Learning-Pure Substances **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science Sample Language Objective (these address a language domain and provide a scaffold for ELs.)

Engaging in Argument from Evidence 7.PS1.3 Students present an argument based on empirical evidence, models, and invoke scientific reasoning. **Suggested Crosscutting Concept(s)** Structure and Function 7.PS1.2 Students begin to attribute atomic structure and interactions between particles to the properties of a material. Stability and Change 7.PS1.3 Students make explanations of stability and change discussing molecular components of a system.		• Students will read with a partner in order to describe different ways in which the particles that make up matter can combine to form various substances. • Students will write using a graphic organizer to classify elements and compounds as two types of pure substances. Pre-teach vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) compound, particles, property, mixture, pure Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. Use graphic organizers or concept maps to support students in their descriptions of different ways in which the particles that make up matter can combine to form various substances Provide compare/contrast sentence stems: This is the same as because . This is different than because . All these are because . , and all have/are

		When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals To support students with the scientific explanation: Describing sentence stems: I observed . I noticed . It reminds me of , because .

7th Grade Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback						
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1 week	**8 weeks**	6 weeks	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (8 weeks)			
Overarching Question(s)			
How can one explain the structure, properties, and interactions of matter?			
Unit 1, Lesson 9	**Lesson Length**	**Essential Question**	**Vocabulary**
Chemical Reactions	2 weeks	How are chemical reactions modeled?	chemical reaction, exothermic reaction, endothermic reaction, law of conservation of energy, law of conservation of mass, chemical formula, chemical equation, reactant, product

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) PS1: Matter and Its Interactions **Standard(s)** 7.PS1.4 Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants and products support the Law of Conservation of Mass.	**Learning Outcomes** • Describe what happens to the atoms of a substance during a chemical reaction. • Identify and describe signs that a chemical reaction take place. • Identify and describe the parts of a chemical formula. • Identify and describe the reactants and products in a chemical reaction. • Balance a chemical equation to demonstrate that chemical reactions observe the law of conservation of mass.	**Curricular Resources** HMH Tennessee Science TE, Unit 2, Lesson 3 pp. 154-167 Engage • Engage Your Brain #1 and 2, SE p. 123 • Active Reading #3, SE p. 123 • Chemical Changes in Apples Daily Demo, TE p. 156 Explore Chemical Reactions • Breaking Bonds in a Chemical Reaction Quick Lab, TE p. 157

Explanation(s) and Support of Standard(s) [from TN Science Reference Guide]

7.PS1.4 Analysis could include either analysis of models of a reaction, or analysis of data collected during a reaction. The purpose of the analysis is to gather evidence that the mass of the reacting substances does not change, although their form may. Balancing a chemical reaction is beyond the scope of this standard.

Models might include written chemical reactions, but should also be supplemented with physical models such as molecular sets that can be assembled, disassembled, and reassembled to demonstrate that rearrangement of atoms which occurs in a chemical reaction.

Analysis should include conceptually recognizing that the conservation of mass only occurs because the mass (total number of protons and neutrons per atom (7.PS1.1)) of each atom in the reactants does not change. Discussions of moles and molar masses are beyond the scope of the grade band.

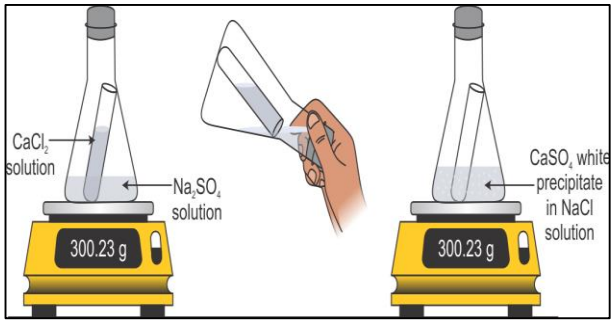
Suggested Science and Engineering Practice(s)

Analyzing and Interpreting Data 7.PS1.4

Students should create and analyze tables of data to identify relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon.

- Compare exothermic and endothermic reactions.
- Describe how chemical reactions observe the law of conservation of energy.
- Describe factors that affect the rate of a chemical reaction.

Suggested Phenomenon



A test tube of calcium chloride ($CaCl_2$) is lowered into a flask of sodium sulfate (Na_2SO_4). The flask, test tube, and its content have a mass of 300.23 grams. The flask is titled to allow the $CaCl_2$ in the test tube to react with the Na_2SO_4 inside the flask. The compounds react to form a white precipitate of calcium sulfate ($CaSO_4$) and a solution of sodium chloride (NaCl). The flask, test tube, and its contents have a mass of 300.23 grams. The reaction of calcium chloride and sodium sulfate occurred in a closed system with no change in mass. The total mass of the reactants is equal to the total mass of

Explain

Chemical Reactions
- Visualize It! #5, SE p. 124

Chemical Equations
- Identify It! #6, SE p. 125
- Visualize It! #s 7-8, SE p. 125
- Active Reading #9, SE p. 126
- Do the Math #10, p. 127
- Think Outside the Book #11, SE p. 127

Energy
- List #12, SE p. 128
- Active Reading #13, SE p. 129
- Compare #14, SE p. 129

Reaction Rates
- Active Reading #15, SE p. 130
- What Factors Affect the Rate of a Chemical Reaction? Virtual Lab, TE p. 157

Extend

Reinforce and Review
- Visual Summary, SE p. 132

Going Further
- Art Connection, TE p. 160
- Why It Matters: Enzymes, SE p. 131

Evaluate

Formative Assessment
- Reteach, TE p. 161
- Throughout TE
- Lesson Review, SE p. 133

Suggested Crosscutting Concept(s) Energy and Matter 7.PS1.4 Students demonstrate conservation of mass in physical and chemical changes.	the products. Students can complete a See Think Wonder Template after examining the picture.	Summative Assessment • Modeling Chemical Equations Activity, TE p. 168 • Balancing Chemical Equations Think Science, SE p. 134-135 • Looking at Chemical Reactions Alternative Assessment, TE p. 161 • Lesson Quiz **Additional Resources** • What is a Chemical Reaction? • Balancing Chemical Equations PhET Interactive Simulations • Baggie Chemistry • Maintaining Mass • 7.PS1.4 Student Activity, Balancing Equations Mat, and Teacher Guide • Legends of Learning-Chemical Reactions: Arrangements of Atoms • Legends of Learning: Chemical Reactions: Evidence of a Reaction • Legends of Learning-Conservation of Matter in Chemical Reactions • Legends of Learning-Energy Transfer in Chemical Reactions • Wait, Weight, Don't Tell Me! Exploratorium Science Snack • Bioluminescence: A Chemical Reaction That Lights up Fireflies and Jellyfish Newsela Article

		• How a Chinese Chemistry Experiment Became a U.S. Fourth of July Tradition Newsela Article **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Sample Language Objective (these address a language domain and provide a scaffold for ELs.) • By working with a partner, students will balance a chemical equation to demonstrate that chemical reactions observe the law of conservation of mass. • Students will write to compare exothermic and endothermic reactions using a graphic organizer and word bank. Pre-teach vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) reaction, interactions, happens