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 provide 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.

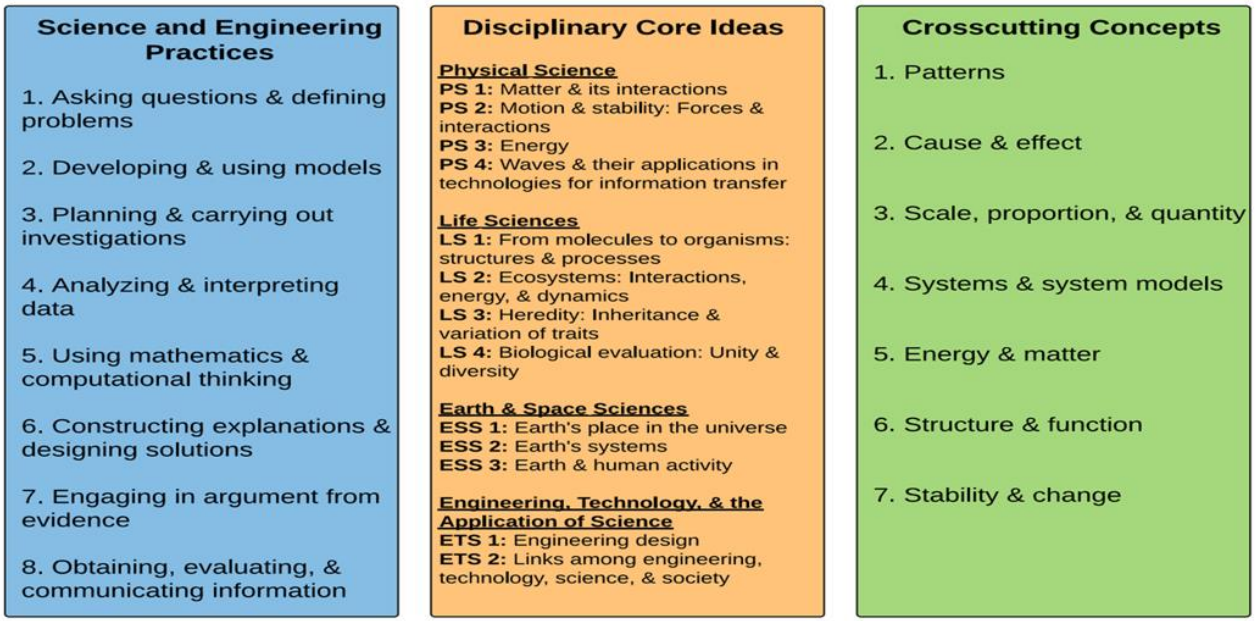
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science 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.

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
deQuarter 1			Quarter 2	Quarter 3	Quarter 4
Structure and Routine	**Unit 1 Matter**	Unit 2 Classifying Information	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	**5 weeks**	3 weeks	9 weeks	9 weeks	9 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

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

Unit 1: Lesson 1	Lesson Length	Essential Question	Vocabulary
Describe Matter	1 week	How do we describe matter?	matter, property, liquid, solid

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.PS1: Matter and Its Interactions K.ETS1: Engineering Design K.ETS2: Links Among Engineering, Technology, Science, and Society **Standard(s)** K.PS1.1: Plan and conduct an investigation to describe and classify different kinds of materials including wood, plastic, metal, cloth, and paper by their observable properties (color, texture, hardness, and flexibility) and whether they are natural or human-made. K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses.	**Learning Outcomes** Students will be able to make observations to classify different types of matter and materials. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, p. 195-196 Science in My World (Phenomenon) Essential Question Science and Engineering Practices Explore TE, pp. 197-198 *(LAB)* Be a Scientist Notebook, p. 86, Inquiry Activity: Matter Scavenger Hunt eBook, p. 4-13: What's the Matter? Explain TE, pp. 199-203

K.ETS1.2: Describe objects accurately by drawing and/or labeling pictures. **Explanation and Support of Standard** TN Science Reference Guide K.PS1.1 This standard begins the development of the idea that all different types of matter (things in the universe) are unique. To appreciate this variability of "stuff," we study the properties of materials. Two materials may appear similar, but as we describe them in more detail we begin to see how each is unique. For example, though crayons and denim might both be blue, they are not both flexible and therefore are classified as different materials. Appreciating differences allows us to see appropriate practical uses for different materials. The sum of the properties of a material make it desirable or undesirable for a specific purpose. Design tasks (e.g., selecting colors for clothing or outdoor furniture) permit students to justify the selection of different materials in their designs based on physical properties. In investigations, students can work in groups to make observations of different materials in graphic organizers. Care should be taken that the objects selected for grouping permit a variety of groupings. For example, some students may form groupings based on color or others by texture, etcetera. Evidence collected during investigations should allow students to classify material as either man-made or naturally occurring. This standard compliments grade	Phenomenon Explanation: The launch of hot air balloons can help students to identify physical properties of matter from the balloon, such as size, shape, texture, and color. This also helps students to understand that hot air inflates the balloon, introducing them to the concept that air takes up space.	Be A Scientist Notebook, Visual Kinesthetic Vocabulary, pp. VKV15-VK16 *(LAB)* Be a Scientist Notebook, p.87, Inquiry Activity: Classify Matter eBook, pp. 14-23: Matter is All Around Us Science Paired Read Aloud/Science File, What Is Matter? Elaborate TE, PP. 204-205 *(LAB)* Be a Scientist Notebook, p. 88, Inquiry Activity: Heavy or Light Evaluate TE, pp. 204-205 *(LAB)* Be a Scientist Notebook, p. 89, Performance Task: What's in the Bag? eAssessment **Additional Resources** Lesson: What's the Matter with Wood and Paper? Video: States of Matter (PBS) **ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4 The Language of Science

level math standards from the Measurement and Data domain. (Measuring is not a grade-appropriate skill. Discussions of size should be relative comparisons.) K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution. Students can be presented with a design task related to a different standard, such as a designing a device to reduce human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution. Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. K.ETS1.2 In early stages, the design process involves actively developing solutions in brainstorming sessions. To participate in collaborative settings, students must be able to make a physical representation of their ideas early in the design process in order to receive feedback from others. In later grades, students will transition from such preliminary drawings to the creation of detailed models and prototypes. The process of labeling such images allows students to recognize that their device		Provide relia (real life objects) to help students understand the concept of matter Ask students to repeat vocabulary as it is introduced. Provide sentences stems: " A ball is a solid because…." " Water is a liquid because…" Model the concept of heavy and light through actions combined with words (TPR Shapes and colors flashcards ELA connections: Module 1, Unit 2- discussing attributes. (Flashcards and visuals available within supporting materials for shape, texture, and size)

consists of a number of smaller parts whose interactions must be considered and planned. **Suggested Science and Engineering Practice(s)** Planning and Carrying Out Controlled Investigations **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** Matter is the substance that all things are made of. All matter has mass, takes up space, and cannot share the same space with other matter. The three common states of matter are solid, liquid, and gas. The state of matter can change depending on its temperature. For example, water can be a solid as ice, a liquid as water, and a gas as water vapor. We describe matter in terms of properties such as size, mass, shape, color, and specific details of structure. Based on our observations, we might describe a ball as spherical and red. Mass is a measure of amount of the matter in an object. The mass of most objects can be measured with a pan balance. **Misconceptions** Students may not understand that all things on Earth are matter. Gases, in particular, might be hard for students to recognize as matter. Blowing up balloons can help students visualize gases as taking up space. Students may initially think of matter only as solid objects. Help them understand that liquids and gases are matter as		

well. Remind them that water freezes to become ice. Students may also think that when things melt or freeze, they become new substances. Tell students that water can freeze into ice and melt back into water, so it is the same matter all the way through the process.		

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
Quarter 1			Quarter 2	Quarter 3	Quarter 4
Structure and Routine	**Unit 1 Matter**	Unit 2 Classifying Information	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	**5 weeks**	3 weeks	9 weeks	9 weeks	9 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

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

Unit 1: Lesson 2	Lesson Length	Essential Question	Vocabulary
Solids	1 week	What are the properties of solids?	natural, material

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.PS1: Matter and Its Interactions K.ETS1: Engineering Design **Standard(s)** K.PS1.1: Plan and conduct an investigation to describe and classify different kinds of materials including wood, plastic, metal, cloth, and paper by their observable properties (color, texture, hardness, and flexibility) and whether they are natural or human-made. K.PS1.2: Conduct investigations to understand that matter can exist in different states (solid and liquid) and has properties that can be observed and tested.	**Learning Outcomes** Students will demonstrate the ability conduct an investigation to describe the properties of solids. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, pp. 209-210 Science in My World, p. 209 (Phenomenon) Essential Questions, p. 210 Science and Engineering Practices, p. 210 Explore TE, pp. 211-212 *(LAB)* Be a Scientist Notebook, p. 91 Inquiry Activity: Make Oobleck eBook: Irene's Exploration, pp. 4-13 Explain TE, pp. 211-212

K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses. **Explanation and Support of Standard** **TN Science Reference Guide** K.PS1.1 This standard begins the development of the idea that all different types of matter (things in the universe) are unique. To appreciate this variability of "stuff," we study the properties of materials. Two materials may appear similar, but as we describe them in more detail we begin to see how each is unique. For example, though crayons and denim might both be blue, they are not both flexible and therefore are classified as different materials. Appreciating differences allows us to see appropriate practical uses for different materials. The sum of the properties of a material make it desirable or undesirable for a specific purpose. Design tasks (e.g., selecting colors for clothing or outdoor furniture) permit students to justify the selection of different materials in their designs based on physical properties. In investigations, students can work in groups to make observations of different materials in graphic organizers. Care should be taken that the objects selected for grouping permit a variety of groupings. For example, some students may form groupings based on color or others by texture, etcetera. Evidence collected during investigations should allow students to classify material as either man-made or naturally occurring. This standard compliments	Phenomenon Explanation: Oobleck has characteristics of both solids and liquids.	Teacher Presentation Slide: Obtain and Communicate Information Science File: What is a Solid? *(LAB)* Be a Scientist Notebook, p. 92. Inquiry Activity: Identify Solids eBook: From Nature or From People, pp. 14-23 Science Paired Read Aloud/Science File: Natural or Human-Made Elaborate TE, pp. 219-220 *(LAB)* Be a Scientist Notebook, p. 94, Inquiry Activity: Measure Solids Evaluate TE, pp. 221-223 *(LAB)* Be a Scientist Notebook, p. 94: A Book About Solids eAssessment **Additional Resources** Lesson Plan: State of Matter Video: States of Matter (PBS) Video: Three States of Matter Video: I Wonder - Episode 11 - Stampylonghead (Stampy Cat) & Keen - Solid, Liquid, or Gas! WONDER QUEST Video: Solid and Liquid

gradelevel math standards from the Measurement and Data domain. (Measuring is not a grade-appropriate skill. K.PS1.2 This standard compliments K.PS1.1, the idea that a sample of matter has definite describable properties, by noting that the properties of a material may change when the sample is transformed from a solid to liquid or the reverse. Students should be making the connections that the changes to the property of the material depend on temperature. Examples may include water occurring as a solid or a liquid depending on whether it is kept cold or allowed to warm, as well as considering other materials that may look like water but not behave similarly (e.g., rubbing alcohol and water can be exposed to the same temperature but will not both become solid despite similar appearances). Students may use properties above as well as considering other properties whether objects float or sink in water, may have characteristic smells, or are attracted to magnets. *(Temperature should be treated in a relative fashion (hotter/colder) as the use of a thermometer requires math skills beyond this grade. Discussion of gases as a phase of matter is not grade appropriate, since this is not a visible form of matter.)*		**ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4 The Language of Science Provide relia (real life objects) to help students understand the concept of matter Ask students to repeat vocabulary as it is introduced. Provide sentences stems: " A ball is a solid because…." " Water is a liquid because…" Model the concept of heavy and light through actions combined with words (TPR Shapes and colors flashcards ELA connections: Module 1, Unit 2- discussing attributes. (Flashcards and visuals available within supporting materials for shape, texture, and size.

K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution. Students can be presented with a design task related to a different standard, such as a designing a device to reduce human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution. Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. **Suggested Science and Engineering Practice(s)** Planning and Carrying Out Controlled Investigations **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** Matter that has a shape of its own is called a solid. Examples of solids include metals, wood, plastics, and paper. In most cases, we describe solids by listing the material they are made of, their size, and their mass (example: a small, heavy, wooden box). When matter is not a solid, it is usually either a liquid or a gas.		

Misconceptions Students may not know that an object is still considered a solid if it contains air. For example, a balloon is a solid, even though the air inside it is a gas. Students may believe that longer solids are always heavier (for example, assuming a large empty, cardboard box is heavier that a small iron bar). Provide examples of solids of the same size, but of different weights, for students to compare. Students may also hold the misconception that all solids are hard and inflexible. Provide materials that students can stretch or form into different shapes, such as elastic bands or clay.		

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
Quarter 1			Quarter 2	Quarter 3	Quarter 4
Structure and Routine	**Unit 1 Matter**	Unit 2 Classifying Information	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	**5 weeks**	3 weeks	9 weeks	9 weeks	9 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

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

Unit 1: Lesson 3	Lesson Length	Essential Question	Vocabulary
Liquids	1.5 weeks	What are the properties of liquids?	freeze, melt

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.PS1: Matter and Its Interactions K.ETS1: Engineering Design **Standard(s)** K.PS1.2: Conduct investigations to understand that matter can exist in different states (solid and liquid) and has properties that can be observed and tested. K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses. **Explanation and Support of Standard** **TN Science Reference Guide** K.PS1.2	**Learning Outcomes** Students will demonstrate the ability to conduct an investigation to describe the properties of liquids. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, pp. 225-226 Science in My World, p. 225 (Phenomenon) Essential Questions, p. 226 Science and Engineering Practices, p. 2226 Explore TE, pp. 227-228 *(LAB)* Be a Scientist Notebook, p. 96 Inquiry Activity: Which Changes Shape? Explain TE, pp. 229-234 Teacher Presentation Slide: Obtain and Communicate Information

This standard compliments K.PS1.1, the idea that a sample of matter has definite describable properties, by noting that the properties of a material may change when the sample is transformed from a solid to liquid or the reverse. Students should be making the connections that the changes to the property of the material depend on temperature. Examples may include water occurring as a solid or a liquid depending on whether it is kept cold or allowed to warm, as well as considering other materials that may look like water but not behave similarly (e.g., rubbing alcohol and water can be exposed to the same temperature but will not both become solid despite similar appearances). Students may use properties above as well as considering other properties whether objects float or sink in water, may have characteristic smells, or are attracted to magnets. *(Temperature should be treated in a relative fashion (hotter/colder) as the use of a thermometer requires math skills beyond this grade. Discussion of gases as a phase of matter is not grade appropriate, since this is not a visible form of matter.)* K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution.	Phenomenon Explanation: Each of these contains has the same amount of the orange liquid in it. Volume of a liquid stays the same as the liquid changes containers. The liquid takes the shape of its container.	Science Paired Read Aloud/Science File: What is a Liquid? Digital Interactive: Compare Solids, Liquids, and Gases Video: States of Matter *(LAB)* Be a Scientist Notebook, p. 97 Inquiry Activity: A Liquid's Shape Teacher Presentation Slide, Science and Engineering Practices <u>Elaborate</u> TE, pp. 234-235 *(LAB)* Be a Scientist Notebook, p. 98 Inquiry Activity: Melt an Ice Cube <u>Evaluate</u> TE, pp. 236-237 *(LAB)* Be a Scientist Notebook, p. 99, Performance Task: Ice Pops eAssessment **Additional Resources** Lesson Plan: <u>State of Matter</u> Video: <u>States of Matter (PBS)</u> Video: <u>Three States of Matter</u> Video: <u>I Wonder - Episode 11 - Stampylonghead (Stampy Cat) & Keen - Solid, Liquid, or Gas! WONDER QUEST</u> Video: <u>Solid and Liquid</u>

Students can be presented with a design task related to a different standard, such as a designing a device to reduce human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution. Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. **Suggested Science and Engineering Practice(s)** Planning and Carrying Out Controlled Investigations **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** A liquid is a substance that flows to fill the shape of its container but has a definite volume. The particles that make up a liquid are less tightly packed than the particles that make up a solid, which gives a liquid may change depending on its container, but its volume does not change unless evaporation takes place (the liquid changes to a gas). Volume is simply a measure of space, such as the capacity of a container. **Misconceptions** Students may think that the volume of a liquid changes when it is poured from one container to another		**ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4 The Language of Science Provide relia (real life objects) to help students understand the concept of matter Ask students to repeat vocabulary as it is introduced. Provide sentences stems: " A ball is a solid because…." " Water is a liquid because…" Model the concept of heavy and light through actions combined with words (TPR Shapes and colors flashcards ELA connections: Module 1, Unit 2- discussing attributes. (Flashcards and visuals available within supporting materials for shape, texture, and size.

because the liquid changes shape. Explain that a certain amount of liquid will have the same volume, regardless of the container it is in. The volume only appears to be lesser or greater because of the shape of the container.		

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
Quarter 1			Quarter 2	Quarter 3	Quarter 4
Structure and Routine	**Unit 1 Matter**	Unit 2 Classifying Information	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	**5 weeks**	3 weeks	9 weeks	9 weeks	9 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

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

Unit 1: Lesson 4	Lesson Length	Essential Question	Vocabulary
Putting Matter Together	1.5 weeks	What are the properties of liquids?	freeze, melt

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.PS1: Matter and Its Interactions **Standard(s)** K.PS1.3: Construct an evidence-based account of how an object made of a small set of pieces (blocks, snap cubes) can be disassembled and made into a new object. K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses. K.ETS2.1: Use appropriate tools (magnifying glass, rain gauge, basic balance scale) to make observations and answer testable questions.	**Learning Outcomes** Students will demonstrate the ability to construct a model to show how matter can be arranged in different ways. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* **Before** **After** 	**Curricular Resources** Engage TE, pp. 239-240 Science in My World, p. 239 (Phenomenon) Essential Questions, p. 240 Science and Engineering Practices, p. 240 Explore TE, pp. 241-242 *(LAB)* Be a Scientist Notebook, p. 101, Inquiry Activity: Change Clay Explain TE, pp. 243-247 Science Paired Read Aloud/Science File: Make Something New

Explanation and Support of Standard **<u>TN Science Reference Guide</u>** K.PS1.3 The objective of this standard is to begin to understand the idea that with a limited number of building materials, a large variety of things can be built. By third grade, students will transpose this concept to the idea that all matter is made up of smaller*, invisible* particles in a way that is similar to assembling a larger object from smaller parts. While this standard alludes to design tasks, this connection to later scientific conceptual understanding is significant. Students can use a set amount of building bricks or other similar pieces to build multiple objects, recognizing that the same number of bricks can be interconnected in multiple ways. The concrete science experiences of constructing and deconstructing parts of larger objects to make something new reinforce more abstract math skills used in K.OA.A.3 and utilized in later addition and subtraction strategies for "making ten." K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution.	Phenomenon Explanation: Students can see that the same amount of blocks are used to build the final toy. This is an introduction to the Law of Conservation of Mass.	eBook: Matter, Properties, and Making Things, pp. 14-23 *(LAB)* Be a Scientist Notebook, p. 102, Inquiry Activity: Get Connected <u>Elaborate</u> TE, pp. 248-249 *(LAB)* Be a Scientist Notebook, p. 103, Inquiry Activity: Build It <u>Evaluate</u> TE, pp. 249-251 *(LAB)* Be a Scientist Notebook, p. 104-105, Make Different Things eAssessment **Additional Resources** Lesson: <u>What is the world made of?</u> Read Aloud Video: <u>What is the world made of?</u> Lesson: <u>Boxes and Blocks</u> Video: <u>Block Building for Kids</u> **ESL Supports and Scaffolds** Provide relia (real life objects) to help students understand the concept of matter Ask students to repeat vocabulary as it is introduced. As students create their toy, partner Entering Level ELs with another more proficient student.

Students can be presented with a design task related to a different standard, such as a designing a device to reduce human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution. Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. K.ETS2.1 The interplay between science and engineering is cyclic. Innovations in engineering create tools that advance the field of science. This standard can bundle into activities where students are using the described tools. Suggestions include magnifying glasses when looking at living/non-living things during K.LS2, rain gauges in K.ESS2, or two-pan balances to observe changes in weight during changes of state in K.PS1. Discussions at those times should promote an appreciation that the tools being used are made by humans. Tools we use allow us to better understand the natural world so tools improve, so does our ability to understand the natural world. *(Student number fluency is still developing, so this standard appears in a similar manner in both kindergarten and first grade. Tools aligned to this standard and grade level should permit relative*		At each step, model for the students what they should do and allow Entering Level ELs to copy your actions. Provide sentence stems to support students in discussing the process. ELA connections: Module 1, Unit 2- discussing attributes. (Flashcards and visuals available within supporting materials for shape, texture, and size)

measurement, and activities involving measurement should consider students' math and numeric abilities.) **Suggested Science and Engineering Practice(s)** Planning and Carrying Out Controlled Investigations **Suggested Crosscutting Concept(s)** Scale, Proportion, and Quantity **Teacher Overview** A physical change occurs when matter changes in size, shape, or state, but the type of matter itself does not change. Matter can be put together and broken apart. Mass is the amount of matter an object contains. The mass of matter remains the same, even though the shape of matter may change. For example, the total mass of a board will remain the same if the board is cut into two pieces. The mass of a lump of clay stays the same even if the shape of the clay changes. **Misconceptions** Students may confuse mass and weight or think they are the same. An object's mass is a measure of the amount of matter in the object, whereas weight is a measure of the pull of gravity on the object. Mass is generally measured in grams or kilograms, while weight is measured in the customary units of ounces or pounds. For the purposes of the activities in Kindergarten, gram cubes are used to measure, but students are never introduced or asked to		

use the terms “mass” or “gram,” they are only asked to count the number of cubes in a pan balance.		

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
Quarter 1			Quarter 2	Quarter 3	Quarter 4
Structure and Routine	Unit 1 Matter	**Unit 2 Classifying Information**	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	5 weeks	**3 weeks**	9 weeks	9 weeks	9 weeks

UNIT 2: Classifying Information (3 weeks)

Overarching Question(s)

How do the structures of organisms enable life's functions?

Unit 2: Lesson 1	Lesson Length	Essential Question	Vocabulary
Our Science Senses	1.5 weeks	How do we use our senses?	hearing, senses, sight

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.LS1 From Molecules to Organisms: Structures and Processes K.ETS1: Engineering Design K.ETS2: Links Among Engineering, Technology, Science, and Society **Standard(s)** K.LS1.3: Explain how humans use their five senses in making scientific findings. K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses. K.ETS1.2: Describe objects accurately by drawing and/or labeling pictures.	**Learning Outcomes** Students will demonstrate the ability to explain how people use their senses to gather information. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*  Phenomenon Explanation:	**Curricular Resources** Engage TE, pp. 5-6 Science in My World, TE p. 5 (Phenomenon) Explore TE, pp. 6-7 *(LAB)* Be a Scientist Notebook, pp. 4-5, Inquiry Activity: What Do You See? Explain TE, pp. 8-11 Digital Interactive: Our Five Senses TE, Visual Kinesthetic Vocabulary pp. VKV1-VKV2

K.ETS2.1: Use appropriate tools (magnifying glass, rain gauge, basic balance scale) to make observations and answer testable questions. **Explanation and Support of Standard** **<u>TN Science Reference Guide</u>** K.LS1.3 Senses allow living things to collect information about their surroundings and communicate it to others. While many organisms use this information for purposes limited to survival and reproduction, humans undertake scientific endeavors to gain an understanding of the natural world. Students should be aware that specific body parts are associated with each sense. (e.g., eyes, ears, skin, etc.) An example may include using a graphic organizer with pictures of eyes, ears, nose, mouth, and hand at the top with space for students to draw their observations below, connecting a physical experience to a sense. They see a pencil, smell vanilla, hear a bell, and feel sandpaper. This sort of activity again supports the measurement and data math activities. K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution. Students can be presented with a design task related to a different standard, such as a designing a device to reduce	A connection can be made about the senses that are used at a carnival fair.	*(LAB)* Be a Scientist Notebook, p. 6, Inquiry Activity: Smell and Tell <u>Elaborate</u> *(LAB)* TE, p. 12, Inquiry Activity: Senses Walk <u>Evaluate</u> TE, pp. 13-15 *(LAB)* Be a Scientist Notebook, p. 7 Performance Task: What Our Senses Tell Us eAssessment **Additional Resources** Lesson: My 5 Senses Lesson: What's That Smell Video: The 5 Senses **ESL Supports and Scaffolds** Five Senses Flashcards and sentence stems Support students in speaking about their senses by using sentence stems: I see I notice, It looks, I use my eyes to…. I use my nose to…

human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution. Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. K.ETS1.2 In early stages, the design process involves actively developing solutions in brainstorming sessions. To participate in collaborative settings, students must be able to make a physical representation of their ideas early in the design process in order to receive feedback from others. In later grades, students will transition from such preliminary drawings to the creation of detailed models and prototypes. The process of labeling such images allows students to recognize that their device consists of a number of smaller parts whose interactions must be considered and planned. K.ETS2.1 The interplay between science and engineering is cyclic. Innovations in engineering create tools that advance the field of science. This standards can bundle into activities where students are using the described tools. Suggestions include magnifying glasses when looking at living/non-living things during K.LS2, rain gauges in K.ESS2, or two-pan balances to observe changes in weight during changes		If needed pre-teach body parts to Entering Level ELs to support them in accessing this content.

of state in K.PS1. Discussions at those times should promote an appreciation that the tools being used are made by humans. Tools we use allow us to better understand the natural world so tools improve, so does our ability to understand the natural world. *(Student number fluency is still developing, so this standard appears in a similar manner in both kindergarten and first grade. Tools aligned to this standard and grade level should permit relative measurement, and activities involving measurement should consider students' math and numeric abilities.)* **Suggested Science and Engineering Practice(s)** Constructing Explanations and Designing Solutions **Suggested Crosscutting Concept(s)** Structure and Function **Teacher Overview** The five senses are sight, hearing, taste, touch, and smell. Each one gives us different information we can use to learn about out world. For example, sight helps us see what something is made of, its color, shape, and size. Smell can help identify something before we see it. Touch can tell us if a thing is hard or soft. Each sense is important when making scientific finding, gathering information, and learning about the world around us. **Misconceptions**		

Students may not realize they can learn things from senses like smell or taste. Help students understand that all our senses are ways to gather information about color, size, texture, how things smell, what they are made of, and what they do.		

Kindergarten Quarter 1 Curriculum Map Quarter 1 Curriculum Map Feedback					
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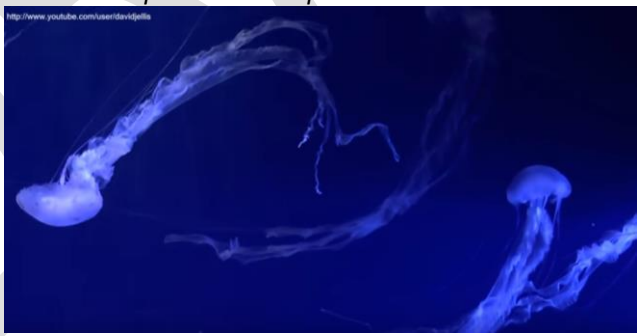
Structure and Routine	Unit 1 Matter	**Unit 2 Classifying Information**	Unit 3 Weather	Unit 4 Plants and Animals	Unit 5 Protecting Our Earth
1 week	5 weeks	**3 weeks**	9 weeks	9 weeks	9 weeks

UNIT 2: Classifying Information (3 weeks)

Overarching Question(s)

How do the structures of organisms enable life's functions?

Unit 2: Lesson 2	Lesson Length	Essential Question	Vocabulary
Living and Nonliving Things	1.5 weeks	How are living and nonliving things different?	living, nonliving

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) K.LS1 From Molecules to Organisms: Structures and Processes K.ETS1 Engineering Design K.ETS2 Links Among Engineering, Technology, Science, and Society **Standard(s)** K.LS1.2: Recognize differences between living and non-living materials and sort them into groups by observable physical attributes. K.ETS1.1: Ask and answer questions about the scientific world and gather information using the senses.	**Learning Outcomes** Students will demonstrate the ability to explain the differences between living and nonliving things. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, pp. 17-18 Science in My World, p. 17 (Phenomenon) Essential Questions, p. 18 Science and Engineering Practices, p. 18 Explore TE, pp. 18-20 *(LAB)* Be a Scientist Notebook, p. 9-10, Inquiry Activity: What Seeds Need to Grow Explain TE, pp. 20-24 TE, Visual Kinesthetic Vocabulary pp. VKV3-VKV4

K.ETS1.2: Describe objects accurately by drawing and/or labeling pictures. **Explanation and Support of Standard** TN Science Reference Guide K.LS1.2 The focus should be on the idea that living organisms all go through a basic life cycle that includes: birth, growth and reproduction, and death. This can extend to the idea that adult plants and animals having young. In some animals, adults and young behave in ways that help the young to survive. Students should be given the opportunity to make observations of sets of living and non-living things in order to create a classification system based on their observations. K.ETS1.1 Engineering leads to improvements in our daily lives and must begin by understanding the problem to be improved by a solution. Students can be presented with a design task related to a different standard, such as a designing a device to reduce human impacts on the environment (K.ESS3.3). Entering a design process is important that students brainstorm questions that would have to be answered in order to develop the best possible solution.	Phenomenon Explanation: The jellyfish video can be used to help students identify living and nonliving components of the oceanic environment.	Video: Living and Nonliving Digital Interactive: Living and Nonliving Things, Digital Interactive: What is Living and Nonliving? Elaborate TE, pp. 24-27 *(LAB)* Be a Scientist Notebook, p. 11 Inquiry Activity: What Living Things Need Digital Interactive: Which is Real? Evaluate TE, pp. 27-29 *(LAB)* Be a Scientist Notebook, p. 12, Performance Task: Tell What is Living and Nonliving eAssessment **Additional Resources** Lesson: Living and Nonliving Video: Living and Nonliving Things **ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4: The Language of Science Provide sentence stems to support students comparing/contrasting living and nonliving items.

Students should begin to explore how the understandings gained by asking the right questions will impact design solutions for an engineering problem. K.ETS1.2 In early stages, the design process involves actively developing solutions in brainstorming sessions. To participate in collaborative settings, students must be able to make a physical representation of their ideas early in the design process in order to receive feedback from others. In later grades, students will transition from such preliminary drawings to the creation of detailed models and prototypes. The process of labeling such images allows students to recognize that their device consists of a number of smaller parts whose interactions must be considered and planned. **Suggested Science and Engineering Practice(s)** Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Structure and Function **Teacher Overview** All living things share certain characteristics, growth, reproduction, the need for food excretion of waste, respiration, and the ability to respond to stimuli. Growth is the increase in size of the total organism, not just of particular parts. Reproduction is the production of new individuals similar to the parent or parents. All living		A living organism--------but a nonliving one_____ Living organisms need_____ Nonliving organisms are_____ Provide visuals of living and nonliving organisms- provide flashcards/words to help students describe them.

things require food for energy. Animals and some microorganisms ingest food, whereas plants and algae use light to produce their own food. Respiration is the exchange of gases with the environment. For plants, this is primarily the intake of carbon dioxide and release of oxygen; for animals, it is the intake of oxygen and release of carbon dioxide. Responses to stimuli generally include movement. Phototropism, a plant's tendency to grow toward the light, is a form of movement. All living this (with a few exceptions, such as mules, who cannot reproduce) display all of these characteristics. Some nonliving things have from one to a few of these characteristics. For example, crystals grow and machines move, even though they are nonliving. Items can also be once living. Items made from objects that were once living, such as a wooden bench or a dried flower arrangement are considered non-living. **Misconceptions** Students may think that lifelike toys that can move and talk are living. Explain that these objects do not move or talk on their own. They typically use batteries or other sources of electricity. Tell students that only living things can move and make sounds on their own. Point out that lifelike toys do not grow or change on their own, as other living things do, not do they reproduce.		