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.

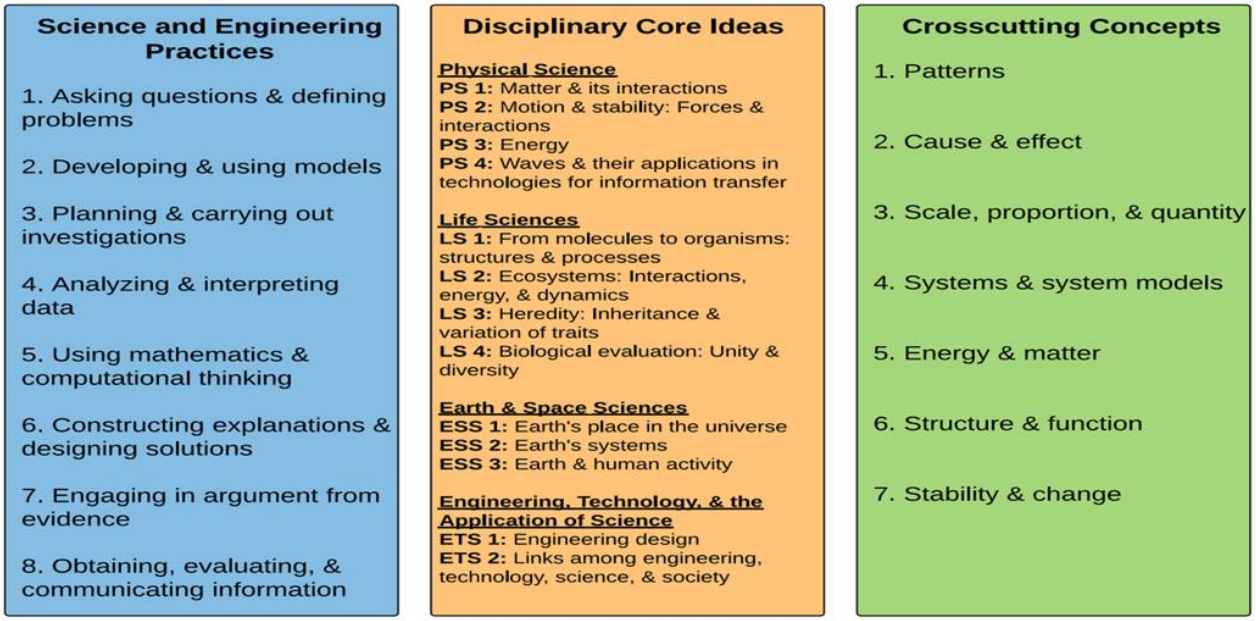
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science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

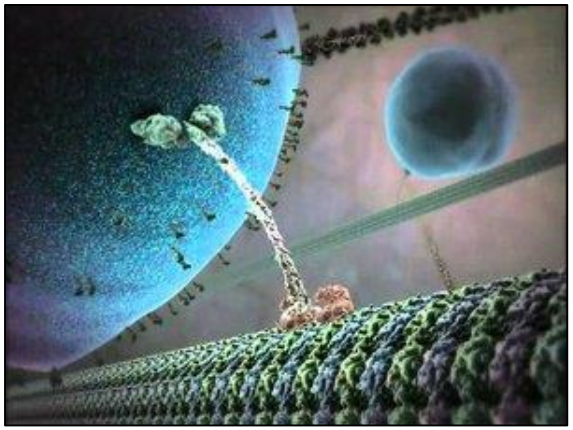
This map is a guide to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the Tennessee Academic Standards for Science, 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 2 Curriculum Map					
Quarter 1	**Quarter 2**		Quarter 3	Quarter 4	
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
9 weeks	**6 weeks**	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 2: Cell Structure and Function (6 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 2, Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
The Characteristics of Cells	1 week	What are living things made of?	cell, organism, cell membrane, cytoplasm, organelle, nucleus, prokaryote, eukaryote

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.1 Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism. **Explanation(s) and Support of Standard(s)** from TN Science Reference Guide Cell models should be a tool that students use to make sense of phenomena, not the outcome of student learning. The focus of this standard is to	**Learning Outcomes** • Describe the relationship between cells and organisms. • Explain why most cells are small in terms of their surface area-to-volume ratio. • Summarize the cell theory. • Summarize the contributions to the cell theory of Robert Hooke, Anton van Leewenhoek, Theodor Schwann, and Rudolf Virchow. • Compare unicellular and multicellular organisms. • Identify the parts that all cells have in common. • Compare prokaryotes and eukaryotes.	**Curricular Resources** HMH Tennessee Science TE, Unit 3, Lesson 1 186-198 Engage • Cells Discussion, TE p. 188 • Engage Your Brain #s 1 and 2, SE p. 145 • Active Reading #s 3 and 4, SE p. 145 Explore The Cell Theory • Seeing and Understanding Activity, TE p. 188 Two Types of Cells • Modeling a Cell Daily Demo, TE p. 189 Explain The Cell • Active Reading #5, SE p. 146

understand that cell organelles work as a system. Single cells (including those within multicellular organisms) must obtain food and water, as well as remove waste— just like multicellular organisms. Organelles distribute these responsibilities, increasing efficiency. Students should be able to identify cellular structures in models in order to account for various cellular activities or to differentiate between plant and animal cells. Students should be able to describe how the components provide the energy that sustains cellular processes, provide structure to the cell, or work together to accomplish cellular functions. Models might be drawn or physical representations of cell parts. Students can compare the main parts of the cell to the parts of a factory or school in function. Microscopes are a great way to examine their own cheek cells. Emphasis is on the function of organelles individually and as part of a larger system of organelles (nucleus, chloroplast, mitochondria, cell membrane, cell wall, vacuole, and cytoplasm). **Suggested Science and Engineering Practice(s)** Developing and Using Models 7.LS1.1 Students create models which are responsive and incorporate features that are not visible in the natural	**Suggested Phenomenon**  The cell is a living machine. Introduce the statement above to students before showing The Inner Life of the Cell (click on the picture to access the video). Students can complete a See Think Wonder Template while watching a white blood cell in the blood vessels of the human body is activated by inflammation.	• Visualize It! #6, SE p. 146 The Cell Theory • Visualize It! #8, SE p. 148 • Think Outside the Book #9, SE p. 149 • Active Reading #10, SE p. 149 Two Types of Cells • Active Reading #11, SE p. 150 • Think Outside the Book #12, SE p. 150 • Active Reading #13, SE p. 151 • Visualize It! #14, SE p. 151 Extend Reinforce and Review • Visual Summary, SE p. 152 Going Further • Social Studies Connection, TE p. 192 Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 153 Summative Assessment • The Basic Unit of Life Alternative Assessment, TE p. 193 • Lesson Quiz **Additional Resources** • Introduction to Cells: The Grand Cell Tour Amoeba Sisters Video • Explainer: Prokaryotes and Eukaryotes Science News for Students Article

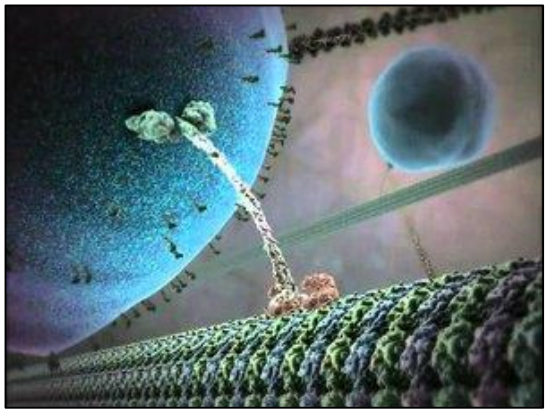
world, but have implications on the behavior of the modeled systems and can identify limitations of their models. **Suggested Crosscutting Concept(s)** Structure and Function 7.LS1.1 Students begin to attribute atomic structure and interactions between particles to the properties of a material.		• The Facts About Cells 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 Objectives: (language domain along with a scaffold) Students will explain why most cells are small in terms of their surface area-to-volume ratio in writing by using a sentence frame and pre-taught vocabulary. Students will summarize the cell theory after reading a text with a partner using a paragraph frame. Pre-teach the vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) volume, surface area

		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. Summarize Sentence Frames: The main idea from this observation is that _____. In short _____, but actually _____. Summarize Vocabulary: as has been noted, in other words, indeed, as I have said, in short, on the whole, for example, in sum, to be sure, for instance, in brief, to sum up, in fact, in any event Visuals for cells

7th Grade Quarter 2 Curriculum Map					
Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	**6 weeks**	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 2: Cell Structure and Function (6 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 2, Lesson 2	**Lesson Length**	**Essential Question**	**Vocabulary**
Cell Structure and Function	2 weeks	What are the different parts that make up a cell?	cytoskeleton, endoplasmic reticulum, vacuole, mitochondrion, Golgi complex, chloroplast, ribosome, cell wall, lysosome, nucleus, cell membrane, cytoplasm

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.1 Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.	**Learning Outcomes** • Describe general characteristics of eukaryotic cells. • Describe how prokaryotes differ from eukaryotes. • Describe the cell membrane, cytoskeleton, and nucleus. • Describe the structure and function of organelles found in eukaryotic cells, including mitochondria, ribosomes, endoplasmic reticulum, and Golgi complex. • Compare and contrast organelles found in plant and animal cells.	**Curricular Resources** HMH Tennessee Science TE, Unit 3, Lesson 3, pp. 214-227 Engage • Engage Your Brain #s 1 and 2, SE p. 165 • Active Reading #s 3 and 4, SE p. 165 Explore Plant and Animal Cells • Cells Walls and Wilting Quick Lab, TE p. 217 • Comparing Cells Quick Lab, TE p. 217 • Analyzing Cells Virtual Lab, TE p. 217 Explain Eukaryotic Cells

Explanation(s) and Support of Standard(s) from TN Science Reference Guide 7.LS1.1 Cell models should be a tool that students use to make sense of phenomena, not the outcome of student learning. The focus of this standard is to understand that cell organelles work as a system. Single cells (including those within multicellular organisms) must obtain food and water, as well as remove waste— just like multicellular organisms. Organelles distribute these responsibilities, increasing efficiency. Students should be able to identify cellular structures in models in order to account for various cellular activities or to differentiate between plant and animal cells. Students should be able to describe how the components provide the energy that sustains cellular processes, provide structure to the cell, or work together to accomplish cellular functions. Models might be drawn or physical representations of cell parts. Students can compare the main parts of the cell to the parts of a factory or school in function. Microscopes are a great way to examine their own cheek cells. Emphasis is on the function of organelles individually and as part of a larger system of organelles (nucleus, chloroplast, mitochondria, cell membrane, cell wall, vacuole, and cytoplasm).	**Suggested Phenomenon**  The cell is a living machine. Introduce this statement to students before showing The Inner Life of the Cell (click on the picture to access the video). Students can complete a See Think Wonder Template while watching a white blood cell in the blood vessels of the human body is activated by inflammation.	• Active Reading #5, SE p. 166 • Visualize It! #6, SE p. 166 • Describe #7, SE p. 167 Parts of Eukaryotic Cells • Explain #8, SE p. 168 • Describe #9, SE p. 168 • Compare #10, SE p. 169 • Describe #11, SE p. 169 Plant and Animal Cells • Active Reading #12, SE p. 170 • Compare #13, SE p. 170 • Visualize It! #14, SE p. 171 • Describe #15, SE p. 171 • Active Reading #17, SE p. 172 • Compare #18, SE p. 172 • Think Outside the Book #19, SE p. 173 • What Am I? Activity, TE p. 216 • Cell Factory Activity, TE p. 216 • Making a 3-D Cell Model, TE p. 217 Extend Reinforce and Review • Mind Map Graphic Organizer, TE p. 220 • Visual Summary, SE p. 174 Going Further • Art Connection, TE p. 220 Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 175

Suggested Science and Engineering Practice(s) Developing and Using Models 7.LS1.1 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)** Structure and Function 7.LS1.1 Students begin to attribute atomic structure and interactions between particles to the properties of a material.		Summative Assessment • Structure and Function Alternative Assessment, TE p. 221 • Lesson Quiz **Additional Resources** • Animal Cells STUDY JAMS! Slide Show and Quiz • Plant Cells STUDY JAMS! Slide Show and Quiz • Cells and Life Science Games-Legends of Learning • Parts of the Cell Science Games-Legends of Learning • Parts of the Cell-Plants vs. Animals Science Games-Legends of Learning • Explainer: Prokaryotes and Eukaryotes Science News for Students 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

		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. Describe Sentence Frames: The _____ has____, and_____. How does the _____? Why did/didn't the _____? _____is located _(prep phrase)_the ____. The _____are usually _____. Describe Signal Words: for example, for instance, in support of this, in fact, as evidence Cell visuals with simplified language

7th Grade Quarter 2 Curriculum Map					
Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	**6 weeks**	**3 weeks**	9 weeks	3 weeks	6 weeks

UNIT 1: Interactions of Matter (9 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 2, Lesson 3	**Lesson Length**	**Essential Question**	**Vocabulary**
The Diversity of Cells	1 week	How are organisms classified?	Bacteria, Eubacteria, Protista, Animalia, Archaea, Archaebacteria, Fungi, Eukarya, kingdom, Plantae

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7. LS1.3 Evaluate evidence that cells have structural similarities and differences across kingdoms. **Explanation(s) Support of Standard(s) from TN Science Reference Guide** 7.LS1.3 Taxonomic classification has developed as human capacity to organize and observe patterns within life has increased. Carl Linnaeus developed his original classification system consisting of two	**Learning Outcomes** • Explain why scientists classify organisms. • Describe the eight levels of classification. • Explain the relationship between classification and cellular structure and composition. • Describe and compare the three domains of organisms. • Identify and describe the kingdoms of prokaryotes. • Describe and compare the four kingdoms of domain Eukarya. • Explain the characteristics used to determine a eukaryotic organism's kingdom.	**Curricular Resources** HMH Tennessee Science TE, Unit 3, Lesson 4 pp. 230-242 Engage • Classifying Beans Activity, TE p. 232 • Engage Your Brain #s 1 and 2, SE p. 179 • Active Reading #s 3 and 4, SE p. 179 Explore Classification • Classifying into Levels Activity, TE p. 232 Eukarya Kingdoms • Culture of Diversity Daily Demo, TE p. 233 Explain

biologically significant families: plants and animals. (Linnaeus also included a now defunct system for classification of minerals.) Understanding of life cycles and the fields of microscopy have led to further expansion of these kingdoms to the six current, widely-accepted, kingdoms: Archaea, Bacteria, Protista, Fungi, Plantae, and Animalia. Current revisions to these kingdoms brought on by advances in gene sequencing have raised questions as to the validity of Kingdom Protista due to the lack of similarity between organisms within this kingdom. Activities may include comparing real plant and animal cells for presence of a nucleus, cell wall, structural orientation of cells, and presence of chloroplasts using a compound light microscope. Students can use examples of prokaryotic and eukaryotic organisms and point out the presence of the nucleus distinguishes the eukaryotes from the prokaryotes. Students should be able to differentiate and classify organisms into the six current kingdoms. Students should understand basic physical characteristics of each kingdom, i.e. being unicellular or multicellular, how food is obtained. (Focus is on structural and functional differences at a cellular level between domains and kingdoms as well as the introduction of increasingly more complex cell structure from prokaryotic to eukaryotic organisms.)	**Suggested Phenomenon**  Two-thirds of ocean life remains undiscovered. As scientists encounter new life, they will classify each organism to learn more about how their discoveries relate to what is already known. Students can complete a See Think Wonder Template after examining the picture. Possible Guiding Questions: How are some of the organisms alike? How are they different? Do the organisms have the same cellular structures? Are the undiscovered organisms similar to organisms that have been classified in a kingdom?	Classification • Apply #5, SE p. 180 • Active Reading #6, SE p. 181 • Visualize It! #7, SE p. 181 Domains and Kingdoms • Compare #8, SE p. 182 • Evaluate #9, SE p. 183 • Classification Poster Take It Home, TE p. 232 Eukarya Kingdoms • Visualize It! #10, SE p. 184 • Active Reading #11, SE p. 185 Extend Reinforce and Review • What's in a Name? Activity, TE p. 236 • Mind Map Graphic Organizer, TE p. 236 • Visual Summary, SE p. 186 Going Further • Real World Connection, TE p. 236 • Earth Science Connection, TE p. 236 Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 187 Summative Assessment • The Diversity of Cells Alternative Assessment, TE p. 237 • Lesson Quiz

Suggested Science and Engineering Practice(s) Constructing Explanations and Designing Solutions 7.LS1.3 Students form explanations using source (including student developed investigations) which show comprehension of parsimony, utilize quantitative and qualitative models to make predictions, and can support or cause revisions of a particular conclusion. **Suggested Crosscutting Concept(s)** Structure and Function 7.LS1.3 Students begin to attribute atomic structure and interactions between particles to the properties of a material.		**Additional Resources** • 7.LS1.3 Student Activity and Teacher Guide • The Kingdoms of Life STUDY JAMS Video and Quiz • Cells and Life Science Games-Legends of Learning • Explainer: Prokaryotes and Eukaryotes Science News for Students Article • Cell Wall Composition of the Six Kingdoms 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 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.

		Classify Sentence Stems: An appropriate name for this group would be _____, owing to the fact that they all _____. According to our classification of _____, we can see that _____. • After we look at _____, we will have to classify _____ based on _____. One of the key characteristics of _____ is _____. A secondary characteristic is _____. • All _____ have _____. _____has _____. Therefore, _____. • _____ is an example/ non-example of _____. Identify Sentence Stems: All _____ are/are not _____. All _____ have/ do not have _____. I classified these by _____. I sorted these by _____. _____ is an example of _____.

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Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	**6 weeks**	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 2: Cell Structure and Function (6 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 2, Lesson 4	**Lesson Length**	**Essential Question**	**Vocabulary**
Levels of Cellular Organization	1 week	How are living things organized?	organism, organ system, tissue, structure, organ, function

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.4 Diagram the hierarchical organization of multicellular organisms from cells to organism. **Explanation(s) and Support of Standards from TN Science Reference Guide** 7.LS1.4 Students should recognize that the specialization of larger organs scales down all the way to specialization individual cells. At the smallest level, groups of specialized cells work together to form	**Learning Outcomes** • Define organism. • Identify that living things are unicellular and multicellular, and describe characteristics of multicellular organisms. • List and diagram levels of hierarchical organization from cell to organism. • Define specialization. • Differentiate between a tissue, organ, and organ system. • Compare types of animal and plant tissues, organs, and organ systems. • Define structure and function.	**Curricular Resources** HMH Tennessee Science TE, Unit 3, Lesson 5 pp. 244-257 Engage • How is an Organism Similar to a City? Probing Question, TE p. 246 • Engage Your Brain #s 1 and 2, SE p. 189 • Active Reading #s 3 and 4, SE p. 189 Cells to Organisms • From Leaf to Cell Daily Demo, TE p. 247 • Organ and Tissue Donation Activity, TE p. 246 Systems Work Together • Roots and Leaves Activity, TE p. 246

tissues. Organs themselves are then composed of some of these different tissue types. While students are not expected to know all tissue types, it is reasonable to examine several organs to observe that within a single organ there are a variety of tissue types. For example, the lungs contain connective tissues, the specialized cells of the epithelium, etc. Groups of organs can also work together to form organ systems and these systems interact with one another to support multicellular organisms. For example, the respiratory and circulatory systems work together to supply oxygen to cells. **Suggested Science and Engineering Practice(s)** Developing and Using Models 7.LS1.4 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)** Systems and System Models 7.LS1.4 Students evaluate the sub-systems that may make up a larger system.	• Explain the basic relationship between the structure and function of tissues, organs, and organ systems. • Describe how various organs and tissues serve the needs of cells for nutrient and oxygen delivery and waste removal. **Suggested Phenomenon**  In 2011, the first synthetic organ transplant occurred in Sweden. Scientists in London created an artificial windpipe which was then coated in stem cells from the patient. Click on the picture to read the article. Possible Guiding Questions: How is the human body organized? What are the levels of organization in organisms?	Explore Cells to Organisms • Observing Plant Organs Quick Lab, TE p. 247 Explain Cells to Organisms • Active Reading #5, SE p. 190 • Venn Diagram #6, SE p. 191 • Visualize It! #7, SE p. 191 • Active Reading #8, SE p. 192 • Visualize It! #9, SE p. 192 • Infer #10, SE p. 193 • Think Outside the Book #11, SE p. 193 Cellular Structure and Function • Active Reading #12, SE p. 194 • Visualize It! #13, SE p. 194 Systems Work Together • Active Reading #17, SE p. 196 • Visualize It! #18, SE p. 196 • Visualize It! #19, SE p. 197 • The Organization of Organisms Exploration Lab, TE p. 247 Extend Reinforce and Review • An Organized Review Activity, TE p. 250 • Cells to Organisms Layered Book, TE p. 250 • Visual Summary, SE p. 198 Going Further • Health Connection, TE p. 250 • Engineering Connection, TE p. 250

		Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 199 • Reteach, TE p. 251 Summative Assessment • Levels of Organization Alternative Assessment, TE p. 251 • Lesson Quiz **Additional Resources** • 7.LS1.4 Student Activity and Teacher Guide • The Human Body STUDY JAMS! Slide Show and Quiz • Human Body cK-12 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 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. Classify/Define Sentence Stems: An appropriate name for this group would be _____, owing to the fact that they all _____. According to our classification of _____, we can see that _____. • After we look at _____, we will have to classify _____ based on _____. One of the key characteristics of _____ is _____. A secondary characteristic is _____. • All _____ have _____. _____has _____. Therefore, _____. • _____ is an example/ non-example of _____. Identify Sentence Stems: All _____ are/are not _____. All _____ have/ do not have _____. I classified these by _____. I sorted these by _____. _____ is an example of _____.

7th Grade Quarter 2 Curriculum Map					
Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	**6 weeks**	3 weeks	9 weeks	3 weeks	6 weeks

UNIT 2: Cell Structure and Function (6 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 2, Lesson 5	**Lesson Length**	**Essential Question**	**Vocabulary**
Homeostasis and Cell Processes	1 week	How do organisms maintain homeostasis?	homeostasis, photosynthesis, cellular respiration, mitosis, diffusion, osmosis, passive transport, active transport, endocytosis, exocytosis

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.2 Conduct an investigation to demonstrate how the cell membrane maintains homeostasis through the process of passive transport.	**Learning Outcomes** • Explain why homeostasis is important for survival. • Describe the needs of cells. • Describe how cells can get energy by photosynthesis and cellular respiration. • Explain that homeostasis is maintained at the cellular level and at higher levels. • Explain why cells divide. • Describe the cell cycle. • Describe why exchange is important for cells. • Compare passive transport and active transport.	**Curricular Resources** HMH Tennessee Science TE, Unit 3, Lesson 6 pp. 258-271 Engage • Maintaining Balance Discussion, TE p. 260 • Engage Your Brain #s 1 and 2, SE p. 201 • Active Reading #4, SE p. 201 Homeostasis in Cells • Diffusion Daily Demo, TE p. 261 Explore Homeostasis in Cells • Diffusion Exploration Lab, TE p. 261 Explain

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

7.LS1.2 The most critical functions of the cell membrane are maintaining cell structure and controlling the materials entering the cell.

A typical and sufficient phenomenon for this standard includes dissolving the egg shell from an egg and exposing the egg to varying solutions. It is not necessary for students to memorize terms describing the solutions (e.g. hypertonic), however students should work with models representing the microscopic components of the solution to make sense the macroscopic changes to their eggs. It is critical that students draw their understanding of this concept beyond simply explaining this one instance of passive transport, but also other analogous instances. Examples might include explaining the function of the contractile vacuoles in plants, or the way that some plants such as *Mimosa pudica* utilize solute concentrations to "reset" after they have been touched.

Suggested Science and Engineering Practice(s)

Planning and Carrying out Controlled Investigations

7.LS1.2

Students begin to investigate independently, select appropriate independent variables to explore a dependent variable and recognize the value of failure and revision in the experimental process.

- Compare endocytosis and exocytosis.
- Explain how organisms can respond to changes in their environment.

Suggested Phenomena

Football player dies after drinking 4 gallons of water and Gatorade. Introduce this statement with this lesson to begin the idea of osmosis and cell size. Click on the picture to watch the video. Students can complete a See Think Wonder Template after watching the video.

Possible Guiding Questions:
How and why did the football player die from drinking too much water?
How is water moved into and out of cells?
Where does the water go after you drink it?
How do the various body systems maintain homeostasis of water?

Homeostasis in Cells
- Think Outside the Book #5, SE p. 202
- Active Reading #6, SE p. 202
- Visualize It! #7, SE p. 202
- Active Reading #8, SE p. 203
- Synthesize #9, SE p. 204
- Active Reading #10, SE p. 205
- Visualize It! #11, SE p. 205
- Active Reading #12, SE p. 206
- Conduct an Investigation #13, SE p. 206
- Visualize It!, SE p. 207
- Describe #15, SE p. 208
- Describe #16, SE p. 208

Homeostasis in Organisms
- Active Reading #17, SE p. 209
- Visualize It!, SE p. 209

Extend

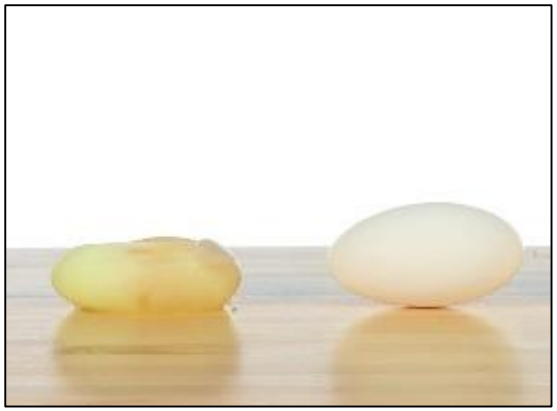
Reinforce and Review
- Concept Map Graphic Organizer, TE p. 264
- Visual Summary, SE p. 210

Going Further
- Physical Education Connection, TE p. 264
- Language Arts Connection, TE p. 264

Evaluate

Formative Assessment
- Throughout TE
- Lesson Review, SE p. 211
- Reteach, TE p. 265

Summative Assessment

Suggested Crosscutting Concept(s) Systems and System Models 7.LS1.2 Students develop models to investigate scales that are beyond normal experiences.	How and why did the football player die from drinking too much water?  Click on the picture to display the Growing and Shrinking Egg Experiment to engage your students in the lesson.	• Lesson Quiz • Unit 3 Connect Essential Questions, SE p. 216 • Think Outside the Book, SE p. 216 • Unit 3 Review, SE p. 217-222 **Additional Resources** • Importance of Diffusion in Organisms • Osmosis: Real-Life Applications • Inside the Cell Membrane Amoeba Sisters Video • 7.LS1.2 Student Activity and Teacher Guide Homeostasis Virtual Lab • Cellular Soap Opera Science Snack • Naked Egg Science Snack **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 Explaining Sentence Stems: The ___ is ___. ___ because ___.

		___ caused ___ to ___. Defining Sentence Stems: A common characteristic of _____ and _____ is_____. A characteristic of _____ and _____ is_____. One attribute of _____ is _____. _____ and _____ have the following traits in common: _____. _____ can be identified by _____.

7th Grade Quarter 2 Curriculum Map					
Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	6 weeks	**3 weeks**	9 weeks	3 weeks	6 weeks

UNIT 3: Human Body Systems (3 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 3, Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Introduction to Body Systems	1 week	How do body systems work together to maintain homeostasis?	homeostasis

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.5 Explain that the body is a system comprised of subsystems that maintain equilibrium and support life through digestion, respiration, excretion, circulation, sensation (nervous and integumentary) and locomotion (musculoskeletal).	**Learning Outcomes** • Describe the relationship between structure and function in body systems. • Summarize the functions of the major organ systems in the human body. • Explain why organ systems work together. • Describe ways in which organ systems interact. • Explain how failure in one organ system can affect the body. • Define homeostasis. • Summarize the basic needs of cells.	**Curricular Resources** HMH Tennessee Science TE, Unit 6, Lesson 1 pp. 460-472 Engage • Engage Your Brain #s 1 and 2, SE p. 351 • Active Reading #s 3 and 4, SE p. 351 • Which Body Systems? Activity, TE p. 462 Explore Functions of Human Body Systems • Body Systems: Their Structures and Functions Quick Lab, TE p. 463 Explain Functions of Human Body Systems • Active Reading #5, SE p. 352 • Visualize It! #6, SE p. 353

Explanation(s) and Support of Standard(s) from TN Science Reference Guide 7.LS1.5 The model developed for 7.LS1.4, is a tool for making sense of events in the natural world. If such a diagram is not as a tool for understanding, it is merely a picture and not a model. This standard is an opportunity to use the models developed in 7.LS1.4 to understand how organ systems interact within organisms. In the context of this standard, the word equilibrium is used synonymous to homeostasis, as opposed to a chemical equilibrium. For example, students might develop explanations for how it is possible that everyone's body is nearly the same temperature despite engaging in different activities, under different environmental conditions. In their explanations, students the distinct roles of individual systems can be used as evidence that there must be coordination between systems in order for the organism to maintain equilibrium. The focus of this standard is on recognizing that systems do interact with each other, not on memorizing all possible types of interactions, nor specific chemicals involved in the pathways. The more technical elements of homeostasis, such as feedback loops, are beyond the scope of the grade band.	**Suggested Phenomena**  Football player dies after drinking 4 gallons of water and Gatorade. This phenomenon was introduced in the previous lesson. Now students will make a connection to the human body systems. Culminating with students being able to explain how the human body systems normally maintain homeostasis and why that did not happen in this case. Click on the picture to watch the video. Students can complete a See Think Wonder Template after watching the video. Possible Guiding Questions: How and why did the football player die from drinking too much water? How is water moved into and out of cells? Where does the water go after you drink it? How do the various body systems maintain homeostasis of water?	• Let's Get Organized Activity, TE p. 462 Interactions of Body Systems • Infer #7, SE p. 354 • Active Reading #8, SE p. 355 • Explain #9, SE p. 355 Maintaining Homeostasis • Visualize It! #10, SE p. 356 • Active Reading #11, SE p. 357 • Two-Column Chart #12, SE p. 357 Extend Reinforce and Review • Working Together Activity, TE p. 466 • Description Wheel Graphic Organizer, TE p. 466 • Visual Summary, SE p. 358 Going Further • Real World Connection, TE p. 466 • Biotechnology Connection, TE p. 466. Evaluate Formative Assessment • Throughout TE • Lesson Review, SE p. 359 • Reteach, TE p. 467 Summative Assessment • Introduction to Body Systems Alternative Assessment, TE p. 467 • Lesson Quiz

Suggested Science and Engineering Practice(s) Constructing Explanations and Designing Solutions 7.LS1.5 Students form explanations using source (including student-developed investigations) which show comprehension of parsimony, utilize quantitative and qualitative models to make predictions, and can support or cause revisions of a particular conclusion. **Suggested Crosscutting Concept(s)** Stability and Change 7.LS1.5 Students make explanations of stability and change discussing molecular components of a system.	How and why did the football player die from drinking too much water?  Click on the picture to take a close look at the fastest man in the world and other runners as they sprint 100 meters. Observe how their muscles, breathing patterns and even facial expressions are all related as they race toward the finish line. This displays how intricate our body systems are and how they work together to perform different body functions. Students can complete a See Think Wonder Template while watching the video.	**Additional Resources** Human Body Systems Amoeba Sisters 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 Explain Sentence Frames: The _____ had _____ so _____. Due to the fact that _____, _____decided to _____. I think _____ is _____ because. I like _____ because _____. Explaining Sentence Stems: The ___ is ___. ___ because ___. ___ caused ___ to ___. Defining Sentence Stems:

		A common characteristic of _____ and _____ is_____. A characteristic of _____ and _____ is_____. One attribute of _____ is _____. _____ and _____ have the following traits in common: _____. _____ can be identified by _____.

7th Grade Quarter 2 Curriculum Map					
Quarter 1	Quarter 2		Quarter 3	Quarter 4	
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
9 weeks	6 weeks	**3 weeks**	9 weeks	3 weeks	6 weeks

UNIT 3: Human Body Systems (3 weeks)			
Overarching Question(s)			
How are engineering, technology, science, and society interconnected?			
Unit 3, Lesson 2	**Lesson Length**	**Essential Question**	**Vocabulary**
Engineering and Life Science	2 weeks	How is engineering related to life science?	technology, engineering

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 7.ETS2: Links Among Engineering, Technology, Science, and Society **Standard(s)** 7.ETS2.1 Examine a problem from the medical field pertaining to biomaterials and design a solution taking into consideration the criteria, constraints, and relevant scientific principles of the problem that may limit possible solutions. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.ETS2.1 Fields such as material sciences depend heavily on the advancement of scientific understanding. The on-going advancement of these	**Learning Outcomes** • Explain two ways in which organisms can be used as part of technological applications. • Describe two ways that new or changed organisms can be the product of technology. • Explain ways in which technology is used by or applied to organisms to help with life processes. • Explain two ways in which new technology can be inspired by living things.	**Curricular Resources** HMH Tennessee Science TE, Unit 6, Lesson 7 pp. 552-565 Engage • Engage Your Brain #s 1 and 2, SE p. 431 • Active Reading #s 3 and 4, SE p. 431 Explore Explain Organisms as Technology • Active Reading #5, SE p. 432 • Visualize It! #6, SE p. 432 • Active Reading #7, SE p. 433 • Think Outside the Book #8, SE p. 433 Technology Changes Organisms • Active Reading #9, SE p. 434

fields is pushed by progress in science. The development of new biomaterials also requires consideration for the long term effects of medical materials that may be used internally, such as heart valves. Finding solutions for material use in the body is difficult. Bioengineers must consider strength, flexibility, durability, and chemical inactivity depending on its role. Students should think about chemical and physical properties of materials and chemical reactivity while engineering design solutions that can be employed to help people with human genetic disorders or mutations.

Suggested Science and Engineering Practice(s)

Asking Questions (for Science) and Defining Problems (for Engineering) 7.ETS2.1

Students define design problems, invoking scientific background knowledge to define multiple criteria and constraints for solutions.

Suggested Crosscutting Concept(s)

Structure and Function 7.ETS2.1

Students design systems, selecting materials for their relevant properties.

Suggested Phenomenon

Biomaterials such as the prosthetic legs in the picture are designed to assist the man with more than just walking. Students can complete a See Think Wonder Template after examining the picture.

- Visualize It! #10, SE p. 434
- Active Reading #11, SE p. 435

Medical Technology

- Active Reading #12, SE p. 436
- Visualize It! #13, SE p. 437
- Think Outside the Book #14, SE p. 437

Biomimicry

- Infer #15, SE p. 438
- Visualize It! #16, SE p. 439

Extend

Reinforce and Review

- Visual Summary, SE p. 440

Going Further

- Real World Connection, TE p. 558

Evaluate

Formative Assessment

- Throughout TE
- Lesson Review, SE p. 441
- Reteach, TE p. 559

Summative Assessment

- Engineering and Life Science Alternative Assessment, TE p. 559
- Lesson Quiz

S.T.E.M. Engineering Design Process, TE p. 566-568

Additional Resources

- Broken Bones & Biomedical Materials
- No Ordinary Coronary Lesson

		• Spinach Leaf Transformed into Beating Human Heart Tissue Article • How 3D Printing Will Change Medicine Article • Engineering Solutions to Biomedical Problems Article • Build Your Own Robot Arm • Build a Helping Hand • Repairing Femoral Fractures • Cool Jobs: Drilling into the Secrets of teeth Science News for Students Article • Sticks and Stones Will Break That Bone! Teach Engineering Hands on Activity • Engineering the Heart: Heart Valves Teach Engineering Lesson • Biomedical Engineering and the Human Body Teach Engineering Unit **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

		Explain Sentence Frames: The _____ had _____ so _____. Due to the fact that _____, _____decided to _____. I think _____ is _____ because. I like _____ because _____. Explaining Sentence Stems: The ___ is ___. ___ because ___. ___ caused ___ to ___. Defining Sentence Stems: A common characteristic of _____ and _____ is_____. A characteristic of _____ and _____ is_____. One attribute of _____ is _____. _____ and _____ have the following traits in common: _____. _____ can be identified by _____.