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.

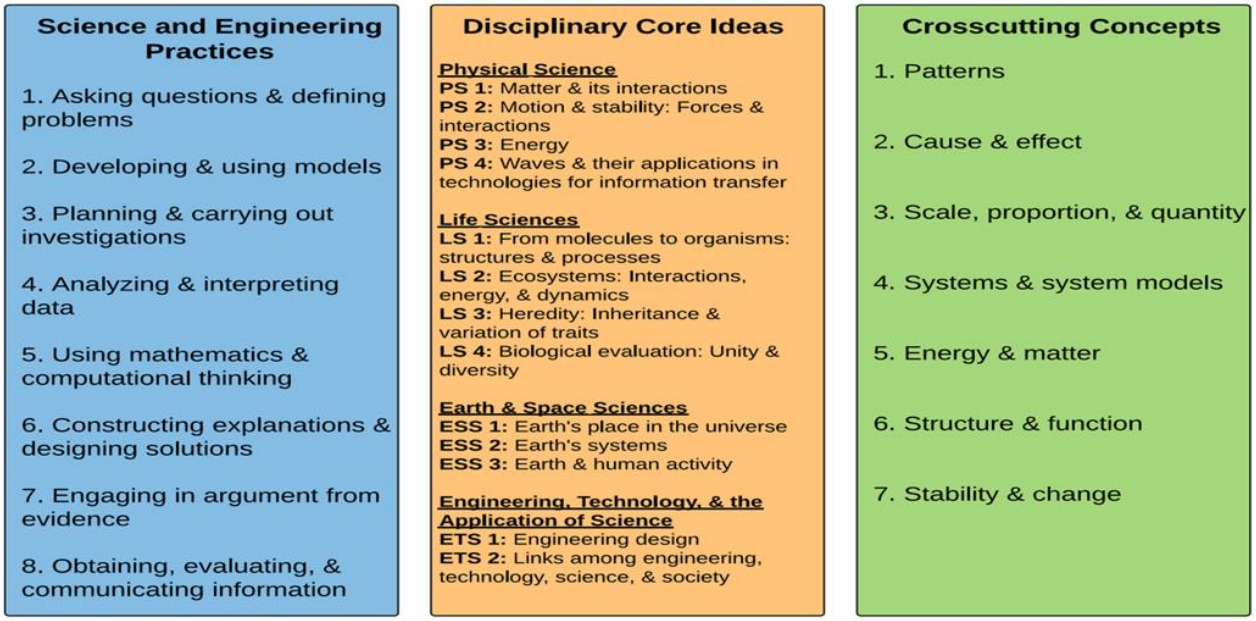
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science 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 4 Curriculum Map Quarter 4 Curriculum Map Feedback					
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 5: Cycling of Matter and Energy (3 weeks)			
Overarching Question(s)			
How do organisms live, grow, respond to their environment, and reproduce?			
Unit 5, Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Photosynthesis and Cellular Respiration	2 weeks	How do cells get and use energy?	photosynthesis, chlorophyll, cellular respiration

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 7.LS1.9 Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.	**Learning Outcomes** • Explain how organisms get energy. • Define and describe photosynthesis. • Describe the starting materials, products, and location of photosynthesis. • Define and describe cellular respiration. • Describe the starting materials, products, and location of cellular respiration.	**Curricular Resources** HMH Tennessee Science TE, Unit 4, Lesson 1, pp. Engage • Engage Your Brain #s 1 and 2, SE p. 227 • Active Reading #s 3 and 4, SE p. 227 Explore Photosynthesis • Observing Photosynthesis Virtual Lab, TE p. 291 Cellular Respiration • Investigate Carbon Dioxide Quick Lab, TE p. 291 Explain Cells Need Energy

Explanation(s) and Support of Standard(s) from TN Science Reference Guide 7.LS1.9 Photosynthesis and respiration provide plants and animals with the matter needed for growth and the energy needed to perform necessary functions. Plants get energy directly from the sun and store this energy in chemicals made using carbon dioxide they take in through their leaves and water absorbed through their roots. Plants get heavier (grow) using air and water alone. Animals are dependent on plants or other animals for food. They take in food and oxygen which gives them energy they need, as well as the matter required to grow. Some organisms are able to release the energy stored in food without sources of oxygen. Evidence can be obtained by observing stomata on the underside of plant leaves, observing changes to water pH (due to dissolved gases) as a result of photosynthesis in plants such as Elodea. For an additional demonstration, use two bowls of sugar water, maintaining one as a control, while adding yeast to the other. From their 7.PS standards, students should recognize that the presence of bubbles is evidence that a substance with a boiling point lower than the water temperature has been	**Suggested Phenomenon**  Introduce students to the statement: Lions eat antelope but lions eventually become grass, which is food for antelope. Give students time to generate and record ideas. Click on the picture to view the video clip of Mufasa explaining the Circle of Life to Simba in The Lion King.	• Active Reading #5, SE p. 228 • Active Reading #6, SE p. 228 • Venn Diagram #7, SE p. 229 • Energy In, Stored, and Out Activity, TE p. 290 Photosynthesis • Active Reading #8, SE p. 230 • Infer #9, SE p. 231 Cellular Respiration • Active Reading #10, SE p. 232 • Think Outside the Book #11, SE p. 233 • Summarize #12, SE p. 233 • From Sugar to ATP Activity, TE p. 290 • Visualize It! #13, SE p. 234 • Summarize #14, SE p. 234 • The Great Cycle Activity, TE p. 290 Extend Reinforce and Review • A Cellular Simulation Activity, TE p. 294 • Why Is It Important? Activity, TE p. 294 • Mind Map Graphic Organizer, TE p. 294 • Visual Summary, SE p. 236 Going Further • Real World Connection, TE p. 294 • Marine Biology Connection, TE p. 294 • Why It Matters, TE p. 235 Evaluate Formative Assessment • Reteach, TE p. 295 • Throughout TE

created. This can lead into questioning of the changes and upon recognizing that the yeast might be converting sugar into a gas, whether or not significant oxygen was available to the yeast to accomplish this aerobically. **Suggested Science and Engineering Practice(s)** Constructing Explanations and Designing Solutions 7.LS1.9 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)** Energy and Matter 7.LS1.9 Students give general descriptions of different forms and mechanisms for energy storage within a system.		• Lesson Review, SE p. 237 Summative Assessment • Energy Flows! Alternative Assessment, TE p. 295 • Lesson Quiz **Additional Resources** • Cellular Respiration and Photosynthesis cK-12 Article • Investigating Photosynthesis Lab • The Simple Story of Photosynthesis and Food Animation • Photosynthesis & Cellular Respiration Simulation • Legends of Learning-Photosynthesis • Photosynthesis STUDYJAMS! Video and Quiz • Where Does a Tree Get Its Mass? Article and Activity • Engaging All Students in Science Practices Through a Cell Modeling Lesson Article and Activity • What If Photosynthesis Stopped Happening? • Photosynthesis Seen From Space Lesson • Why Do Sunflowers Follow the Sun? Video • Photosynthesis Demonstration Video • The Earth Has Lungs. Watch Them Breathe 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 Scaffolded Photosynthesis lesson with word sort, sentence stems and cloze reads Photosynthesis video Photosynthesis worksheets with visuals for ELs 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 define and describe photosynthesis by speaking to a partner using a sequence graphic organizer and pre-taught vocabulary. Sequence sentence stems to describe the process of photosynthesis: We saw that first, _____, then, _____

		and at the end, _____. <u>Question Starters</u> What's the connection between….? What link do you see between… Why do you think…? What is our evidence that…. Do we have enough evidence to make that claim? But what about this other evidence that shows….? <u>Response Starters</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that… Your explanation makes me think about …..

7th Grade Quarter 4 Curriculum Map Quarter 4 Curriculum Map Feedback					
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 5: Cycling of Matter and Energy (3 weeks)			
Overarching Question(s)			
How and why do organisms interact with their environment and what are the effects of these interactions?			
Unit 5, Lesson 2	**Lesson Length**	**Essential Question**	**Vocabulary**
Energy and Matter in Ecosystems	2 weeks	How do matter and energy move through ecosystems?	matter, energy, ecosystem, energy pyramid, carbon cycle, water cycle, nitrogen cycle, law of conservation of mass, law of conservation of energy

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) LS2: Ecosystems: Interactions, Energy, and Dynamics **Standard(s)** 7.LS2.1 Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem.	**Learning Outcomes** • Explain how ecosystems function as open systems. • Explain the laws of conservation of energy and mass. • Explain how organisms get energy and building materials. • Describe how some energy obtained by an organism is used immediately and some is stored. • Interpret an energy pyramid. • Describe the water cycle.	**Curricular Resources** HMH Tennessee Science TE, Unit 4, Lesson 2, pp. 302-315 Engage • Engage Your Brain #s 1 and 2, SE p. 239 • Active Reading #s 3 and 4, SE p. 239 • Modeling an Energy Pyramid Activity, TE p. 304 Explore Cycles of Matter • Model the Carbon Cycle Quick Lab, TE p. 305

Explanation(s) and Support of Standard(s) from TN Science Reference Guide 7.LS2.1 7.LS1.9 and 7.LS2.1 present two different lenses for an organism's relationship with matter and energy. Standard 7.LS1.9 belongs to disciplinary core idea LS1 which explores structures and processes at a scale up to a single organism. 7.LS2.1 extends that scale to address how multiple organisms are interconnected by exchanges of matter and energy within an ecosystem. Discussions must include the significance of plants which are able to convert non-food materials into food materials. Carbon accounts for a major percentage of a human's weight. And while carbon dioxide surrounds us, we lose it constantly as a result of cellular respiration, and yet we are wholly dependent upon plants to make this source or carbon reusable to us. Inversely, plants are dependent on a separate set of molecules (abiotic) in order to be able to capture the sun's energy. Plants need the oxygen released by plants to store the sun's energy or use it immediately. **Suggested Science and Engineering Practice(s)** Developing and Using Models 7.LS2.1 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	• Describe the nitrogen cycle. • Describe the carbon cycle. **Suggested Phenomenon**  Each EcoSphere contains active micro-organisms, small shrimp, algae, and bacteria existing in filtered sea water. Because the EcoSphere is a self-sustaining ecosystem, you never have to feed the life within. Simply provide a source of indirect natural or artificial light. The living organisms within the EcoSphere utilize their resources without overpopulating or contaminating their environment. Students can complete a See Think Wonder Template after examining the picture.	• Investigating the Carbon Cycle Virtual Lab, TE p. 305 Explain Matter and Energy in Ecosystems • Active Reading #5, SE p. 240 • Infer #6, SE p. 240 • It Matters in the Real World Activity, TE p. 304 • Visualize It! #7, SE p. 241 • Venn Diagram #8, SE p. 241 Energy Pyramids • Visualize It! #9, SE p. 242 • Pyramid of Energy Quick Lab, TE p. 305 Cycles of Matter • Active Reading #10, SE p. 243 • Visualize It! #11, SE p. 243 • Active Reading #12, SE p. 244 • Visualize It! #13, SE p. 244 • Visualize It! #14, SE p. 245 • Active Reading #15, SE p. 246 • Visualize It! #16, SE p. 246 • Carbon In and Out Activity, TE p. 304 • Think Outside the Book #17, SE p. 246 • Think Outside the Book #18, SE p. 247 Extend Reinforce and Review • Interconnection Challenge Activity, TE p. 308 • Visual Summary, SE p. 248 Going Further

modeled systems and can identify limitations of their models. **Suggested Crosscutting Concept(s)** Energy and Matter 7.LS2.1 Students give general descriptions of different forms and mechanisms for energy storage within a system.		• Environmental Science Connection, TE p. 308 • Engineering Connection, TE p. 308 Evaluate Formative Assessment • Reteach, TE p. 309 • Throughout TE • Lesson Review, SE p. 249 Summative Assessment • Energy and Matter Add UP Alternative Assessment, TE p. 309 • Lesson Quiz **Additional Resources** • Cycles of Matter cK-12 Teacher Resources • The Carbon Cycle STUDY JAMS! Video and Quiz • Photosynthesis Seen From Space Lesson • The Earth Has Lungs. Watch Them Breathe 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 Open and closed system visual Ecosystem resources for ESL students

		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 read a text about how ecosystems function as open systems and summarize what they've read to a partner. To support students in summarizing: Write a summary narrative to communicate what was learned; ask questions and make predictions based on the newly acquired knowledge. Sentence stems and language: Answer the focus question by rewriting it as a statement and providing evidence from the text. Make a concluding statement. I learned….. therefore, I think…… The main idea from this text is that _____. In short _____, but actually _____. Vocabulary to use in explaining: 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 the event of

7th Grade Quarter 4 Curriculum Map Quarter 4 Curriculum Map Feedback					
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 6: Earth's Atmosphere (6 weeks)			
Overarching Question(s)			
How do Earth's surface processes and human activities affect each other?			
Unit 6, Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
The Atmosphere	1 week	What is the atmosphere?	atmosphere, mesosphere, ozone layer, air pressure, stratosphere, greenhouse effect, thermosphere, troposphere

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) ESS3: Earth and Human Activity **Standard(s)** 7.ESS3.1 Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.ESS3.1 The atmosphere is ~78% nitrogen, ~21% oxygen, ~1% argon, water vapor, carbon dioxide, and other trace gases. The services provided by the	**Learning Outcomes** • Define atmosphere. • Identify and describe the main components of Earth's atmosphere. • Define air pressure and describe how air pressure changes with altitude. • Explain why temperature changes as altitude increases. • Describe how the atmosphere protects life. • Describe how the atmosphere insulates the planet.	**Curricular Resources** HMH Tennessee Science TE, Unit 7, Lesson 1, pp. 584-597 Engage • Engage Your Brain #s 1 and 2, SE p. 457 • Active Reading #s 3 and 4, SE p. 457 Composition, Air Pressure, and Temperature of the Atmosphere • Role-Playing the Atmosphere Activity, TE p. 586 Life and the Atmosphere • The Greenhouse Effect Daily Demo, TE p. 586

atmosphere are a product of its microscopic structure. Services range from water cycling, to protecting from high energy radiation, or adding stability to Earth's temperatures.

Students should examine both the major and trace gases making up Earth's atmosphere. Discussions regarding the potential for atmospheric change should center on how natural biogeochemical cycles and human impacts determine its composition. Discussion of atmospheric change should include identification of greenhouse gases and the mechanism by which these gases affect climate change.

Suggested Science and Engineering Practice(s)

Using Mathematics and Computational Thinking

7.ESS3.1 Students can use computing to process large amounts of data in order to develop mathematical representations (ratios, percentages, rates) that will help evaluate a scientific explanation.

Suggested Crosscutting Concept(s)

Stability and Change 7.ESS3.1

Students make explanations of stability and change discussing molecular components of a system.

Suggested Phenomenon

Pulp mill smokestacks belch smoke above clouds near Eureka, California. When fossil fuels such as coal are burned for energy, huge amounts of carbon dioxide are released into the Earth's atmosphere, intensifying the greenhouse effect. Students can complete a See Think Wonder Template after examining the picture.

Explore

Composition, Air Pressure, and Temperature of the Atmosphere

- Composition and Structure of the Atmosphere Virtual Lab, TE p. 587

Explain

Composition, Air Pressure, and Temperature of the Atmosphere

- Visualize It! #5, SE p. 458
- Active Reading #6, SE p. 459
- Inquiry #7, SE p. 459

Structure of the Atmosphere

- Visualize It! #9, SE p. 461

Life and the Atmosphere

- Visualize It! #10, SE p. 462
- Active Reading #11, SE p. 462
- Visualize It! #12, SE p. 463
- Greenhouse Temperatures Activity, TE p. 586

Extend

Reinforce and Review

- Idea Wheel Graphic Organizer, TE p. 590
- Visual Summary, SE p. 464

Going Further

- Real World Connection, TE p. 590
- Fine Arts Connection, TE p. 590

Evaluate

Formative Assessment

- Reteach, p. 591

		• Throughout TE • Lesson Review, SE p. 465 Summative Assessment • The Atmosphere Alternative Assessment, TE p. 591 • Lesson Quiz **Additional Resources** • 7.ESS3.1 Teacher Guide and Student Activity • A Gassy World Article and Activity • The Greenhouse Effect PhET Interactive Simulation **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 Altitude and temperature with visuals Sample Language Objectives: (language domain along with a scaffold)

		• Students will explain in writing why temperature changes as altitude increases using a graphic organizer and sentence frames. Support students in explaining by: Provide claims and evidence: write assertions about what was learned from the investigation, use the data as evidence to support those claims. Explain sentence stems: Use inferential logical connectors such as *although*, *while*, *thus*, *therefore*. Temperature is connected to altitude increases because….

7th Grade Quarter 4 Curriculum Map Quarter 4 Curriculum Map Feedback					
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 6: Earth's Atmosphere (6 weeks)			
Overarching Question(s)			
How do Earth's surface processes and human activities affect each other?			
Unit 6, Lesson 2	**Lesson Length**	**Essential Question**	**Vocabulary**
Human Impact on the Atmosphere	2 weeks	How do humans impact Earth's atmosphere?	air quality, particulate, ozone, smog, air pollution, acid precipitation

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) ESS3: Earth and Human Activity **Standard(s)** 7.ESS3.1 Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change. 7.ESS3.2 Engage in a scientific argument through graphing and translating data regarding human activity and climate.	**Learning Outcomes** • Explain why the atmosphere is important. • Define air pollution, and identify its sources. • Describe how smog forms. • Define particulates. • Summarize vehicle emissions' effects on air. • Explain how air pollution can lead to acid precipitation. • Describe the effect of acid precipitation. • Define air quality, and tell how it is measured. • Describe how air pollution affects health. • Describe how air pollution might be affecting our planet.	**Curricular Resources** HMH Tennessee Science TE, Unit 7, Lesson 2, pp. 598-611 Engage • Engage Your Brain #s 1 and 2, SE p. 467 • Active Reading #s 3 and 4, SE p. 467 Effects of Human Activities • When the Wind Blows Daily Demo, TE p. 601 Explore Air and Air Pollution • Identifying Sources of Indoor Air Pollution. TE p. 601 • Air Pollution Virtual Lab, TE p. 601

Explanation(s) and Support of Standard(s) from TN Science Reference Guide	Suggested Phenomenon	
7.ESS3.1 The atmosphere is ~78% nitrogen, ~21% oxygen, ~1% argon, water vapor, carbon dioxide, and other trace gases. The services provided by the atmosphere are a product of its microscopic structure. Services range from water cycling, to protecting from high energy radiation, or adding stability to Earth's temperatures. Students should examine both the major and trace gases making up Earth's atmosphere. Discussions regarding the potential for atmospheric change should center on how natural biogeochemical cycles and human impacts determine its composition. Discussion of atmospheric change should include identification of greenhouse gases and the mechanism by which these gases affect climate change. 7.ESS3.2 The industrialization of many nations has increased the rate that humans extract resources from the Earth. The processing of natural resources and creation of synthetic materials has changed patterns in global temperatures, including areas not developed or occupied by humans. Examples of changes to natural systems could include changes to timing of migration patterns or life cycles of organisms, or changes to glaciers and arctic ice. The behavior of natural systems can accelerate the effects	Carbon dioxide (CO_2) is an important heat-trapping (greenhouse) gas, which is released through human activities such as deforestation and burning fossil fuels, as well as natural processes such as respiration and volcanic eruptions. The first graph shows atmospheric CO_2 levels measured at Mauna Loa Observatory, Hawaii, in recent years, with average seasonal cycle removed. Students can complete a See Think Wonder Template after examining the graph.	Explain Air and Air Pollution • Visualize It! #5, SE p. 468 • Active Reading #6, SE p.468 • Active Reading #7, SE p. 469 • Visualize It! #8, SE p. 469 Effects of Human Activities on Atmosphere • Active Reading #9, SE p. 470 • Active Reading #10, SE p. 471 • Analyze #11, SE p. 471 Air Quality and Health • Visualize It! #12, SE p. 472 • Visualize It! #13, SE p. 473 • Think Outside the Book #14, SE p. 473 • Identify #15, SE p.473 Air Pollution and Earth • Graph #16, SE p. 474 • Active Reading #17, SE p. 474 • Infer #18, SE p. 475 • Inquiry #19, SE p. 475 • Change in the Air Discussion, TE p. 600 Extend Reinforce and Review • Visual Summary, SE p. 476 Going Further Evaluate Formative Assessment • Reteach, TE p. 605 • Throughout TE

of human activities. Warming the atmosphere increases the amount of water that can be held in the atmosphere, thus when it does rain, the amount of rainfall will be greater, increasing instances of flooding or heavier snowfalls. Arguments constructed should cite evidence that correlates changes in the patterns for natural processes with changes in the patterns of human activities. Data sets can include levels of carbon dioxide in the atmosphere, the temperature of the earth, levels of energy use, efficiency of energy use, glacial land areas, ocean water levels, areas of polar ice, and areas of forested land. Human activities include the release of greenhouse gases. Extension of this discussion should address the use of scientific understanding and engineering to drive future decision making. **Suggested Science and Engineering Practice(s)** Using Mathematics and Computational Thinking 7.ESS3.1 Students can use computing to process large amounts of data in order to develop mathematical representations (ratios, percentages, rates) that will help evaluate a scientific explanation.		• Lesson Review, SE p. 477 Summative Assessment • Improve a City Alternative Assessment, TE p. 605 • Lesson Quiz **Additional Resources** • People and Climate Change: The Data Is In Lesson **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Air pollution resource with visuals Air pollution video Air pollution text with visuals and simplified sentences

Asking Questions and Defining Problems 7.ESS3.2 Questions originate based on experience as well as need to clarify and test other explanations, or determine explicit relationships between variables. **Suggested Crosscutting Concept(s)** Stability and Change 7.ESS3.1, 7.ESS3.2 Students make explanations of stability and change discussing molecular components of a system.		Sample Language Objectives: (language domain along with a scaffold) Students will use a graphic organizer to write in order to define air pollution, and identify its sources. Cause and effect sentence stems: The _____ had _____ so _____. Due to the fact that _____, _____decided to _____. Signal Words: since, caused by, in effect, because of, this results in, brought about, due to, consequently, made possible, for this reason, accordingly, as might be expected, therefore, as a result of, give rise to, If…then, leads to, was responsible for

7th Grade Quarter 4 Curriculum Map Quarter 4 Curriculum Map Feedback					
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 6: Earth's Atmosphere (6 weeks)			
Overarching Question(s)			
How do Earth's surface processes and human activities affect each other?			
Unit 6, Lesson 3	**Lesson Length**	**Essential Question**	**Vocabulary**
Climate Change	2 weeks	How do people model and predict the effects of human activities on Earth's climate?	climate, ice age, greenhouse effect, global warming

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) ESS3: Earth and Human Activity **Standard(s)** 7.ESS3.2 Engage in a scientific argument through graphing and translating data regarding human activity and climate. **Explanation(s) and Support of Standard(s) from TN Science Reference Guide** 7.ESS3.2 The industrialization of many nations has increased the rate that humans extract resources from the Earth. The processing of natural resources and creation of synthetic materials has changed	**Learning Outcomes** • Explain that Earth's climate has naturally varied throughout geologic history. • Identify and describe examples of natural events that cause changes in Earth's climate. • Explain that human activities increase levels of greenhouse gases in the atmosphere and contribute to global warming. • Identify and describe ways that humans can reduce the rate of global warming. • Recognize that global warming is a global issue and involves economic, political, and scientific factors.	**Curricular Resources** HMH Tennessee Science TE, Unit 7, Lesson 3, pp.616-633 Engage • Engage Your Brain #s 1 and 2, SE p. 483 • Active Reading #4, SE p. 483 • Icecaps Melting Daily Demo, TE p. 619 Explore Natural Climate Change • Graphing Sunspots Quick Lab, TE p. 619 Climate Change and Human Activity • Greenhouse Effect Quick Lab, TE p. 619 Explain Natural Climate Change

patterns in global temperatures, including areas not developed or occupied by humans. Examples of changes to natural systems could include changes to timing of migration patterns or life cycles of organisms, or changes to glaciers and arctic ice. The behavior of natural systems can accelerate the effects of human activities. Warming the atmosphere increases the amount of water that can be held in the atmosphere, thus when it does rain, the amount of rainfall will be greater, increasing instances of flooding or heavier snowfalls. Arguments constructed should cite evidence that correlates changes in the patterns for natural processes with changes in the patterns of human activities. Data sets can include levels of carbon dioxide in the atmosphere, the temperature of the earth, levels of energy use, efficiency of energy use, glacial land areas, ocean water levels, areas of polar ice, and areas of forested land. Human activities include the release of greenhouse gases. Extension of this discussion should address the use of scientific understanding and engineering to drive future decision making. **Suggested Science and Engineering Practice(s)** Asking Questions and Defining Solutions 7.ESS3.2 Questions originate based on experience as well as need to clarify and test other explanations, or determine explicit relationships between variables.	**Suggested Phenomenon**  Glacier National Park is Melting Away: Present the picture to students or click on the picture to watch the video. The park once had 150 glaciers and now it only has 25. The video shows evidence of how drastically the glaciers are being shaped by our warming planet. Stop the video at 00:39 and allow students to complete a See Think Wonder Template after viewing the before and after pictures of the glaciers.	• Visualize It! #5, SE p. 484 • Visualize It! #6, SE p. 485 • Active Reading #7, SE p. 485 • Do the Math #8, SE p. 486 • Visualize It! #9, SE p. 487 • Active Reading #10, SE p. 487 Climate Change and Human Activity • Active Reading #11, SE p. 488 • Visualize It! #12, SE p. 489 • Visualize It! #13, SE p. 489 • Synthesize #14, SE p. 489 • Infer #15, SE p. 490 • Infer #16, SE p. 491 • Active Reading #17, SE p.491 • Visualize It! #18, SE p. 492 • The Global Warming Debate Activity, TE p. 618 • Natural vs. Human Causes Discussion, TE p. 618 Reducing Climate Change • Do the Math #19, SE p. 493 • Do the Math #20, SE p. 493 • Summarize #21, SE p. 494 • Think Outside the Book #22, SE p. 494 • Active Reading #23, SE p. 495 • Think Outside the Book #24, SE p. 495 • Predict #25, SE p. 495 • Visualize It! #26, SE p. 496 • Summarize #27, SE p. 497

Suggested Crosscutting Concept(s) Stability and Change 7.ESS3.2 Students make explanations of stability and change discussing molecular components of a system.		Extend Reinforce and Review • Mind Map Graphic Organizer, TE p. 622 • Visual Summary, SE p. 498 Going Further • Earth Science Connection, TE p. 622 Evaluate Formative Assessment • Reteach, TE p. 623 • Throughout TE • Lesson Review, SE p. 499 Summative Assessment • Causes of Climate Change Alternative Assessment, TE p. 623 • Lesson Quiz **Additional Resources** • Is Climate Change Fanning Megafires? Article • Explainer: Global Warming and the Greenhouse Effect • People and Climate Change: The Data Is In Lesson • The Heat is On: Cause and Effect and Climate Lesson **ESL Supports and Scaffolds** WIDA Standard 4 - The Language of Science To support students in speaking, refer to this resource:

		WIDA Doing and Talking Science 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 talk with a partner to explain that Earth's climate has naturally varied throughout geologic history using a text and evidence. Support students in explaining by: Provide claims and evidence: write assertions about what was learned from the investigation, use the data as evidence to support those claims. Explain sentence stems: Use inferential logical connectors such as *although*, *while*, *thus*, *therefore*. To support students in summarizing**:** Write a summary narrative to communicate what was learned; ask questions and make predictions based on the newly acquired knowledge.

		Sentence stems and language: Answer the focus question by rewriting it as a statement and providing evidence from the text. Make a concluding statement. I learned….. , therefore, I think The main idea from this text is that _____. In short _____, but actually _____. Vocabulary to use in explaining: 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 the event of