

PHYSICAL SCIENCE

Curriculum Guide

Tennessee's K-12 science standards are intended to guide the development and delivery of educational experiences that prepare all students for the challenges of the 21st Century. You may access these documents using the **Best for All Central** website:
<https://bestforall.tnedu.gov/lessons-and-learning-item?content-id=9109>

Encounter The Phenomenon: These phenomena are the engaging centerpieces of each unit and module to inspire students to investigate key science and engineering concepts through the three-dimensional learning experience. As students investigate each phenomenon, they will use their Claim, Evidence, and Reasoning process to solve and explain the unit and module phenomena.

1 st Quarter					
Module 1: The Nature of Science					
Phenomenon: How do we know how rainbows form?					
Standard(s)	Learning Objective(s)	CCC/SEP	McGraw Alignment	Assessments	Pacing
This module introduces “the what” science is and provides tools for the study of science.	<p>Students will explore the tools and methods of science. This will lead them to understand how science is used to answer questions.</p> <p>Students will explore units and measurement. This will lead them to understanding how standards and units are important in discussing scientific ideas.</p> <p>Students will explore how graphs present information. This will lead them to understand how to both read and communicate with graphs.</p> <p>Students will explore technology as the application of science. This will lead them to understand the driving forces behind technological advancement.</p>	<div>Science Engineering Practices</div> <p>All <i>Science and Engineering Practices</i> are embedded in this module as an intro to the curriculum.</p> <div>Crosscutting Concepts</div> <p>All <i>Crosscutting Concepts</i> are embedded in this module as an intro to the curriculum.</p>	<p><u>Module 1:</u> Lessons 1-4 (pgs. 3-33)</p>	<p>Module Vocabulary Practice: The Nature of Science  GO ONLINE</p> <p>Module Test: The Nature of Science  GO ONLINE</p>	5 Days

Unit 1: Motion and Forces					
Unit Phenomenon: How could the athlete jump higher?					
Standard(s)	Learning Objective(s)	CCC/SEP	McGraw Alignment	Assessments	Pacing
PSCI.PS2.1 PSCI.PS2.2	<p>Students will explore position and motion. This will lead them to understanding how to describe where an object is and how its moving.</p> <p>Students will explore velocity and momentum. This will lead them to understand the motor bike's velocity and momentum can change even if it maintains its speed.</p> <p>Students will explore changes in velocity and acceleration. This will lead them to understand that the motor bikes arc can be described with a constant acceleration.</p>	<div>Science Engineering Practices</div> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Using Mathematics and Computational Thinking</p> <div>Crosscutting Concepts</div> <p>Systems and System Models</p>	<p><u>Module 2:</u> Lessons 1 -3 (pgs. 37-57)</p> <p><u>Encounter the Phenomenon:</u> Why is this motor bike traveling in an arc?</p>	<p>Module Vocabulary Practice: Motion  GO ONLINE</p> <p>Module Test: Motion  GO ONLINE</p>	3.5 Days
PSCI.PS2.3 PSCI.PS2.4 PSCI.PS2.5	<p>Students will explore types and characteristics of forces. This will lead them to understand that the mass of an object affects the forces on it.</p> <p>Students will explore Newton's laws of motion. This will lead them to understand how his laws describe how forces move cars.</p> <p>Students will explore the interactions between force, acceleration, and momentum. This will lead them to understand how to describe and predict the motion of cars and trains.</p>	<div>Science Engineering Practices</div> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Planning and Carrying Out Controlled Investigations</p> <div>Crosscutting Concepts</div> <p>Cause and Effect</p>	<p><u>Module 3:</u> Lessons 1-3 (pgs. 59-83)</p> <p><u>Encounter the Phenomenon:</u> Why can a car stop faster than a train?</p>	<p>Module Vocabulary Practice: Forces and Newton's Laws  GO ONLINE</p> <p>Module Test: Forces and Newton's Laws  GO ONLINE</p>	5.5 Days

Unit 2: Energy					
Unit Phenomenon: How can energy be collected and stored for daily use?					
PSCI.PS3.1 PSCI.PS3.3 PSCI.PS3.4	<p>Students will explore how to do work. This will lead them to understand that work is done when something moves in the direction it is forced.</p> <p>Students will explore the forms and transfer of energy. This will lead them to understand that the transfer of energy from warm air to cold ice does work.</p> <p>Students will explore the conservation of energy. This will lead them to understand that cooling a block of ice does not destroy the heat energy, it just moves the energy out of the ice.</p>	<div>Science Engineering Practices</div> <p>Asking Questions and Defining Solutions</p> <p>Developing and Using Models</p> <p>Using Mathematics and Computational Thinking</p> <div>Crosscutting Concepts</div> <p>Energy and Matter</p> <p>System and System Models</p>	<p>Module 4: Lessons 1-3 (pgs. 87-111)</p> <p><u>Encounter the Phenomenon:</u> How can ice be used as an alternative energy source?</p>	<p>Module Vocabulary Practice: Work and Energy</p> <p> GO ONLINE</p> <p>Module Test: Work and Energy</p> <p> GO ONLINE</p>	7 Days
PSCI.PS3.2 PSCI.PS3.4	<p>Students will explore the relationships between heat, thermal energy, and temperature. This will lead them to understand that the amount of thermal energy in an object is dependent on more than its temperature.</p> <p>Students will explore how heat moves. This will lead them to understand how they can promote and restrict the movement of heat.</p> <p>Students will explore thermodynamics and using heat to do work. This will lead them to understand how to use thermal energy to their advantage.</p>	<div>Science Engineering Practices</div> <p>Using Mathematics and Computational Thinking</p> <p>Engaging in Arguments from Evidence</p> <p>Developing and Using Models</p> <div>Crosscutting Concepts</div> <p>Systems and System Models</p> <p>Energy and Matter</p>	<p>Module 5: Lessons 1-3 (pgs. 113-137)</p> <p><u>Encounter the Phenomenon:</u> Why would it be useful to visualize thermal energy?</p>	<p>Module Vocabulary Practice: Thermal Energy</p> <p> GO ONLINE</p> <p>Module Test: Thermal Energy</p> <p> GO ONLINE</p>	5 Days

PSCI.PS3.5	<p>Students will explore static electricity. This will lead them to understand what electric charges move through.</p> <p>Students will explore how charge moves through conductors. This will lead them to understand how conductors and currents affect each other.</p> <p>Students will explore circuits. This will lead them to understand how to make electric circuits that provide electricity to the devices that need it, without losing the electricity to the surroundings.</p>	<div>Science Engineering Practices</div> <p>Engaging in Argument from Evidence</p> <p>Developing and Using Models</p> <p>Using Mathematics and Computational Thinking</p> <div>Crosscutting Concepts</div> <p>Cause and Effect</p>	<p>Module 6: Lessons 1-3 (pgs. 139-163)</p> <p><u>Encounter the Phenomenon:</u> How can you safely conduct electricity underwater?</p>	<p>Module Vocabulary Practice: Electricity GO ONLINE</p> <p>Module Test: Electricity GO ONLINE</p>	5 Days
PSCI.PS2.6	<p>Students will explore the properties of magnets and magnetic fields. This will lead them to understand the significance of magnetic poles and the role they play on Earth.</p> <p>Students will explore how magnetic fields form in the presence of an electric current. This will lead them to understand the properties and applications of electromagnets.</p> <p>Students will explore the properties of electromagnetic induction. This will lead them to understand the function of generators and transformers.</p>	<div>Science Engineering Practices</div> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, and Communicating Information</p> <div>Crosscutting Concepts</div> <p>Cause and Effect</p>	<p>Module 7: Lessons 1-3 (pgs. 165-189)</p> <p><u>Encounter the Phenomenon:</u> What makes something magnetic?</p>	<p>Module Vocabulary Practice: Magnetism and Its Uses GO ONLINE</p> <p>Module Test: Magnetism and Its Uses GO ONLINE</p>	4.5 Days
PSCI.PS3.4 PSCI.PS3.3	<p>Students will explore the types of fossil fuels that are used for energy. This will lead them to understand why fossil fuels are classified as nonrenewable energy sources.</p> <p>Students will explore the composition of the nuclear reactors that contain nuclear</p>	<div>Science Engineering Practices</div> <p>Obtaining, Evaluating, and Communicating Information</p>	<p>Module 8: Lessons 1-4 (pgs. 191-221)</p> <p><u>Encounter the Phenomenon:</u> How could this relatively small space produce enough</p>	<p>Module Vocabulary Practice: Energy Sources and the Environment GO ONLINE</p>	7 Days

	<p>reactions. This will lead them to understand the potential benefits and risks of nuclear energy.</p> <p>Students will explore the clean-energy alternatives to fossil fuels. This will lead them to understand the energy potentials behind renewable energy sources.</p> <p>Students will explore the carrying capacity of Earth and the impact humans have on the environment. This will lead them to understand how they can reduce their pollution output.</p>	<p>Developing and Using Models</p> <p>Engaging in Argument from Evidence</p> <p>Using Mathematics and Computational Thinking</p> <p>Crosscutting Concepts</p> <p>Energy and Matter</p> <p>Stability and Change</p>	nuclear energy to sustain millions of people?	<p>Module Test: Energy Sources and the Environment</p> <p> GO ONLINE</p>	
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Quarter 2

Unit 3: Waves

Unit Phenomenon: How do waves interact with our senses?

Standard(s)	Learning Objective(s)	CCC/SEP	McGraw Alignment	Assessments	Timeframe
PSCI.PS4.1	<p>Students will explore the properties of waves and how they transfer energy. This will lead them to understand how these concepts apply to seismic waves.</p> <p>Students will explore the components of waves. This will lead them to understand the differences between longitudinal and transverse waves.</p> <p>Students will explore how waves behave when they encounter either an obstacle or another medium. This will lead them to understand how these behaviors apply to sound waves.</p>	<p>Science Engineering Practices</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Developing and Using Models</p> <p>Crosscutting Concepts</p> <p>Cause and Effect</p> <p>Energy and Matter</p>	<p>Module 9: Lesson 1-3 (pgs. 225-249)</p> <p><u>Encounter the Phenomenon:</u> How do buildings move during an earthquake?</p>	<p>Module Vocabulary Practice: Introduction to Waves</p> <p> GO ONLINE</p> <p>Module Test: Introduction to Waves</p> <p> GO ONLINE</p>	5 Days
PSCI.PS4.1	Students will explore the structure and creation of sound waves. This will lead them	<p>Science Engineering Practices</p>	Module 10 Lessons 1-4 (pgs. 251-275)	<p>Module Vocabulary Practice: Sound</p>	5 Days

	<p>to understand how sound is made, travels, and is heard.</p> <p>Students will explore the properties of sound waves. This will lead students to understand how sound is measured.</p> <p>Students will explore sound in music. This will lead them to understand how music is made and how it is different from noise.</p> <p>Students will explore the uses of sound in technology. This will lead them to understand how sound is used to make images of things that cannot be seen.</p>	<p>Obtaining, Evaluating, and Communicating Information</p> <p>Using Mathematics and Computational Thinking</p> <p>Developing and Using Models</p> <p>Crosscutting Concepts</p> <p>Energy and Matter</p> <p>Structure and Function</p>	<p><u>Encounter the Phenomenon:</u> Why do two instruments that are playing the same note sound different?</p>	<p> GO ONLINE</p> <p>Module Test: Sound</p> <p> GO ONLINE</p>	
PSCI.PS4.2	<p>Students will explore the structure of electromagnetic waves. This will lead them to understand the similarities and differences between electromagnetic waves and other waves.</p> <p>Students will explore the electromagnetic spectrum. This will lead them to understand how the properties of electromagnetic waves change as they become more energetic.</p> <p>Students will explore the uses of radio and microwaves in communication. This will lead them to understand the technology we use to send messages around the world.</p>	<p>Science Engineering Practices</p> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Crosscutting Concepts</p> <p>Systems and System Models</p>	<p>Module 11: Lessons 1-3 (pgs. 277-299)</p> <p><u>Encounter the Phenomenon:</u> How do we see X-rays?</p>	<p>Module Vocabulary Practice: Electromagnetic Waves</p> <p> GO ONLINE</p> <p>Module Test: Electromagnetic Waves</p> <p> GO ONLINE</p>	6 Days
PSCI.PS4.2	<p>Students will explore how light interacts with itself and other materials. This will lead them to understand how light behaves when it is broadcast.</p> <p>Students will explore how color is seen and what happens with different colors are</p>	<p>Science Engineering Practices</p> <p>Obtaining, Evaluating, and Communicating Information</p>	<p>Module 12: Lessons 4 (pgs. 301-325)</p> <p><u>Encounter the Phenomenon:</u> How does light transmit information?</p>	<p>Module Vocabulary Practice: Light</p> <p> GO ONLINE</p> <p>Module Test: Light</p>	8 Days

	<p>mixed. This will lead them to understand how light is perceived.</p> <p>Students will explore how lightbulbs, lasers, and other emitters of light work. This will lead them to understand how light is generated.</p> <p>Students will explore ways to use polarizing filters, holograms, and optical fibers. This will lead them to understand that light can be used to transmit information.</p>	<p>Planning and Carrying Out Investigations</p> <p>Engaging in Argument from Evidence</p> <p>Crosscutting Concepts</p> <p>Cause and Effect</p>		<p> GO ONLINE</p>	
Unit 4: Matter					
Unit Phenomenon: Why can dry ice go directly from a solid to a gas?					
<p>PSCI.PS1.1</p> <p>PSCI.PS1.2</p>	<p>Students will explore the kinetic theory and how it connects the arrangement and behavior of atoms, ions, and molecules to the common state of matter.</p> <p>Students will explore the properties and behavior of fluids, including three of the major principles that describe fluids- Archimedes', Pascal's, and Bernoulli's.</p> <p>Students will explore how gases are affected by changes in pressure, volume, and temperature. They will apply Boyle's and Charles's laws to calculate how one variable responds to changes in another.</p>	<p>Science Engineering Practices</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Using Mathematics and Computational Thinking</p> <p>Crosscutting Concepts</p> <p>Energy and Matter</p>	<p>Module 13: Lesson 1-3 (pgs. 329-371)</p> <p><u>Encounter the Phenomenon:</u> Why does a balloon crumple and shrink when liquid nitrogen is poured on it?</p>	<p>Module Vocabulary Practice: Solids, Liquids, and Gases</p> <p> GO ONLINE</p> <p>Module Test: Solids, Liquids, and Gases</p> <p> GO ONLINE</p>	5 Days
PSCI.PS1.3	<p>Students will explore the composition of matter, with a focus on identifying and classifying pure substances and mixtures.</p>	<p>Science Engineering Practices</p> <p>Using Mathematics and Computational Thinking</p>	<p>Module 14: Lessons 1-2 (pgs. 353-371)</p> <p><u>Encounter the Phenomenon:</u></p>	<p>Module Vocabulary Practice: Classification of Matter</p> <p> GO ONLINE</p>	3 Days

	Students will explore the properties and changes of matter. They will apply the law of conservation of mass to chemical changes.	Developing and Using Models Engaging in Argument from Evidence <div>Crosscutting Concepts</div> Energy and Matter	Could a person really sink and disappear into a pit of quicksand.	Module Test: Classification of Matter GO ONLINE	
3 rd Quarter					
Unit 4: Matter					
Unit Phenomenon: Why can dry ice go directly from a solid to a gas?					
Standard(s)	Learning Objective(s)	CCC/SEP	McGraw Alignment	Assessments	Timeframe
PSCI.PS1.4	<p>Students will explore the subatomic particles that make up atoms, how scientist model atoms, and the history of the atomic model. This will lead them to understand how atoms are different elements are differentiated and organized on the periodic table.</p> <p>Students will explore atomic mass and mass number. This will lead them to understand isotopes and the role that atomic mass plays in the organization of the periodic table.</p> <p>Students will explore the origins of the periodic table as well as the structure and function of the different elements. This will lead them to understand the reasoning behind the different colors on the periodic table.</p>	<div>Science Engineering Practices</div> Developing and Using Models Obtaining, Evaluating, and Communicating Information <div>Crosscutting Concepts</div> Scale, Proportion, and Quantity	Module 15: Lessons 1-3 (pgs. 373-395) <u>Encounter the Phenomenon:</u> Why are there different colors on this periodic table?	Module Vocabulary Practice: Properties of Atoms and The Periodic Table GO ONLINE Module Test: Properties of Atoms and The Periodic Table GO ONLINE	5.5 Days
PSCI.PS1.3 PSCI.PS1.4 PSCI.PS1.5	Students will explore metals and their properties. This will lead them to understand why the flames of some metals burn with different colors.	<div>Science Engineering Practices</div> Obtaining, Evaluating, and Communicating Information	Module 16: Lesson 1-3 (pgs. 397-421) <u>Encounter the Phenomenon:</u>	Module Vocabulary Practice: Elements and Their Properties	5 Days

	<p>Students will explore nonmetals and their properties. This will lead them to understand isotopes and the role that atomic mass plays in the organization of the periodic table.</p> <p>Students will explore mixed groups, semiconductors, and metalloids. This will lead them to understand the properties and applications of different elements.</p>	<p>Developing and Using Models</p> <p>Crosscutting Concepts</p> <p>Patterns</p>	<p>Why does this lava burn blue?</p>	<p> GO ONLINE</p> <p>Module Test: Elements and Their Properties</p> <p> GO ONLINE</p>	
Unit 5: Matter					
Unit Phenomenon: Why are the jellyfish glowing?					
<p>PSCI.PS1.4</p> <p>PSCI.PS1.5</p> <p>PSCI.PS1.6</p>	<p>Students will explore how and why compounds form. This will lead them to understand why the properties of compounds are different than their constituent atoms.</p> <p>Students will explore ionic and covalent bonds. This will lead them to understand why some elements share electrons, while others donate or receive them.</p> <p>Students will explore methods for writing chemical formulas, the importance of oxidation numbers, and how to name polyatomic ions. This will lead them to understand the importance of chemical formulas.</p>	<p>Science Engineering Practices</p> <p>Developing and Using Models</p> <p>Crosscutting Concepts</p> <p>Patterns</p> <p>Energy and Matter</p>	<p>Module 17: Lessons 1-3 (pgs. 425-447)</p> <p><u>Encounter the Phenomenon:</u> What makes these rock crystals from perfect cubes?</p>	<p>Module Vocabulary Practice: Chemical Bonds</p> <p> GO ONLINE</p> <p>Module Test: Chemical Bonds</p> <p> GO ONLINE</p>	4.5 Days
<p>PSCI.PS1.6</p> <p>PSCI.PS1.7</p>	<p>Students will explore chemical reactions. This will lead them to understand how to write and balance chemical equations.</p> <p>Students will explore the different types of chemical reactions. This will lead them to understand that chemical reactions are organized into five basic classes.</p>	<p>Science Engineering Practices</p> <p>Obtaining, Evaluating, and Communicating Information</p>	<p>Module 18: Lessons 1-4 (pgs. 449-475)</p> <p><u>Encounter the Phenomenon:</u> What chemical reactions occur when you back cupcakes?</p>	<p>Module Vocabulary Practice: Chemical Reactions</p> <p> GO ONLINE</p>	5.5 Days

	<p>Students will explore the relationship between chemical reactions and energy. This will lead them to understand how chemical reactions release or absorb energy.</p> <p>Students will explore reaction rates and equilibria. This will lead them to understand what affects the reaction rate and equilibria.</p>	<p>Using Mathematics and Computational Thinking</p> <p>Developing and Using Models</p> <p>Crosscutting Concepts</p> <p>Energy and Matter</p>		<p>Module Test: Chemical Reactions</p> <p> GO ONLINE</p>	
PSCI.PS1.5	<p>Students will explore the nucleus of an atom. This will lead them to understand isotopes, atomic numbers, and mass numbers.</p> <p>Students will explore nuclear radiation. This will lead them to understand the types of nuclear radiations, when nuclear fission occurs, and when nuclear fusion occurs.</p> <p>Students will explore the applications of radiation. This will lead them to understand how nuclear radiation is detected, medical applications of nuclear radiation, and applications of radioactivity and half-life.</p>	<p>Science Engineering Practices</p> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Crosscutting Concepts</p> <p>Energy and Matter</p>	<p>Module 19: Lessons 1-3 (pgs. 477-497)</p> <p><u>Encounter the Phenomenon:</u> How does a nuclear reactor work?</p>	<p>Module Vocabulary Practice: Radioactivity and Nuclear Reactions</p> <p> GO ONLINE</p> <p>Module Test: Radioactivity and Nuclear Reactions</p> <p> GO ONLINE</p>	4.5 Days
4 th Quarter					
Unit 6: Applications of Chemistry					
Unit Phenomenon: How are advancements in chemistry related to technology?					
Standard(s)	Learning Objective(s)	CCC/SEP	McGraw Alignment	Assessments	Timeframe
PSCI.PS1.3	<p>Students will explore solutes, solvents, and solutions. This will lead them to understand how solutions form.</p> <p>Students will explore concentration and solubility. This will lead them to understand the relationship between concentration and solubility, and the types of solutions.</p>	<p>Science Engineering Practices</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Planning and Carrying Out Investigations.</p>	<p>Module 20: Lessons 1- 4 (pgs. 501-525)</p> <p><u>Encounter the Phenomenon:</u> How do crystals form?</p>	<p>Module Vocabulary Practice: Solutions</p> <p> GO ONLINE</p> <p>Module Test: Solutions</p>	8 Days

	<p>Students will explore how ions form in solutions. This will lead them to understand ionization and dissociation.</p> <p>Students will explore why water does not always dissolve substances. This will lead them to understand how polarity affects solubility.</p>	<div>Crosscutting Concepts</div> <p>Energy and Matter</p>		 GO ONLINE	
PSCI.PS1.7 PSCI.PS1.8	<p>Students will explore acids and bases. This will lead them to understand how acids and bases from ions in solution, and how common acids and bases are used.</p> <p>Students will explore what makes an acid or a base either strong or weak. This will lead them to understand how acids and bases are classified.</p> <p>Students will explore what a salt is and how it forms. This will lead them to understand neutralization reactions and salt formation.</p>	<div>Science Engineering Practices</div> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, and Communicating Information</p> <div>Crosscutting Concepts</div> <p>Structure and Function</p>	<p>Module 21: Lessons 1-3 (pgs.527-547)</p> <p><u>Encounter the Phenomenon:</u> How do you determine if this stream is acidic or basic?</p>	<p>Module Vocabulary Practice: Acids, Bases, and Salts</p>  GO ONLINE	5 Days
PSCI.PS1.3 PSCI.PS1.5	<p>Students will explore why carbon can form many compounds. This will lead them to understand organic compounds and hydrocarbons.</p> <p>Students will explore substituted hydrocarbons. This will lead them to understand the properties and uses of substituted hydrocarbons.</p>	<div>Science Engineering Practices</div> <p>Developing and Using Models</p> <p>Engaging in Argument from Evidence</p> <div>Crosscutting Concepts</div> <p>Structure and Function</p>	<p>Module 22: Lessons 1-4 (pgs. 549-575)</p> <p><u>Encounter the Phenomenon:</u> Why is this natural fire always burning?</p>	<p>Module Vocabulary Practice: Organic Compounds</p>  GO ONLINE	7 Days

	<p>Students will explore organic compounds. This will lead them to understand how organic compounds can combine to form polymers.</p> <p>Students will explore the four major types of biological compounds. This will lead them to understand the structure of proteins, carbohydrates, lipids, and nucleic acids.</p>				
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