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 a meaningful curriculum 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 curriculum 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.

Science and Engineering Practices

1. Asking questions & defining problems
2. Developing & using models
3. Planning & carrying out investigations
4. Analyzing & interpreting data
5. Using mathematics & computational thinking
6. Constructing explanations & designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, & communicating information

Disciplinary Core Ideas

Physical Science
PS 1: Matter & its interactions
PS 2: Motion & stability: Forces & interactions
PS 3: Energy
PS 4: Waves & their applications in technologies for information transfer

Life Sciences
LS 1: From molecules to organisms: structures & processes
LS 2: Ecosystems: Interactions, energy, & dynamics
LS 3: Heredity: Inheritance & variation of traits
LS 4: Biological evaluation: Unity & diversity

Earth & Space Sciences
ESS 1: Earth's place in the universe
ESS 2: Earth's systems
ESS 3: Earth & human activity

Engineering, Technology, & the Application of Science
ETS 1: Engineering design
ETS 2: Links among engineering, technology, science, & society

Crosscutting Concepts

1. Patterns
2. Cause & effect
3. Scale, proportion, & quantity
4. Systems & system models
5. Energy & matter
6. Structure & function
7. Stability & change

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 defines 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.

Physical World Concepts Quarter 3 Curriculum Map Curriculum Map Feedback Survey			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1 Motion and Stability: Forces and Interaction	Unit 2 Energy	**Unit 3 Waves and Their Applications in Technologies for Information Transfer**	Unit 4 Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks

Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**

Overarching Question(s)
What are the characteristic properties and behaviors of waves?

Unit, Lesson	Lesson Length	Essential Question	Vocabulary
Unit 3 Waves and Their Applications in Technologies for Information Transfer	**2 Weeks**	• Where do waves come from? • How do you know that waves carry energy? • Explain how knowledge of waves helps us understand our world better and improve the quality of our lives?	Simple harmonic motion, amplitude, period, frequency, medium, mechanical wave, transverse wave, crest, trough, wavelength, longitudinal wave, constructive interference, constructive interference, standing wave, node, antinode

Standards and Related Background Information	Instructional Focus	Instructional Resources
<u>DCI</u> PS4 Waves and Their Applications in Technologies for Information Transfer **<u>Standard</u>** **PWC.PS4.1** Build a model of a wave that describes the following characteristics of longitudinal waves and transverse waves: wavelength, frequency, period, amplitude, and velocity. **PWC.PS4.2** Quantify the relationship among the frequency, wavelength, and the speed of a wave. **<u>Misconceptions</u>** • Waves transport matter. • There must be a medium for a wave to travel through. • Waves do not have energy. • All waves travel the same way.	**<u>Learning Outcomes</u>** • Identify the amplitude of vibration. • Recognize the relationship between period and frequency. • Calculate the period and frequency of an object vibrating with simple harmonic motion. **<u>Phenomenon</u>** 	**<u>Curricular Materials</u>** **<u>Engage</u>** **<u>Explore</u>** Lab: Wave, frequency and Amplitude **<u>Explain</u>** **<u>Elaborate</u>** **<u>Evaluate</u>** **<u>Textbook</u>** **No textbook adopted for this subject**

• Big waves travel faster than small waves in the same. **Science and Engineering Practice** 8. Obtaining, evaluating, and communicating information **Cross Cutting Concepts** 3.Systems and System Models		

Physical World Concepts Quarter 3 Curriculum Map [Curriculum Map Feedback Survey]			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1 Motion and Stability: Forces and Interaction	Unit 2 Energy	**Unit 3** **Waves and Their Applications in Technologies for Information Transfer**	Unit 4 Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks
Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**			
Overarching Question(s)			
What are the characteristic properties and behaviors of waves?			

Unit, Lesson	**Lesson Length**	**Essential Question**	**Vocabulary**
Unit 3 **Waves and Their Applications in Technologies for Information Transfer**	**1 Week**	• Identify, Draw, and Contrast a longitudinal wave and a transverse wave. • Explain Constructive and Destructive Interference. • Contrast Mechanical Waves and Electromagnetic Waves.	Medium, crest, longitudinal wave, mechanical wave, trough, transverse wave, wavelength

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI PS4 Waves and Their Applications in Technologies for Information Transfer **Standard** **PWC.PS4.3** Compare and contrast the properties and the applications of mechanical and electromagnetic waves. **Misconceptions**	**Learning Outcomes** • Distinguish local particle movement from overall wave motion. • Interpret waveforms of transverse and longitudinal waves. • Apply the relationship among wave speed, frequency, and wavelength to solve problems. **Phenomenon**	**Curricular Materials** **Engage** Animation: [longitudinal and transverse wave] **Explore** Lab: [longitudinal and transverse wave] **Explain** **Elaborate**

Some students may confuse the graph of a transverse pulse, with the graph of a longitudinal pulse. Point out that in the first case, the y-axis represents displacement, while in the latter case, the y-axis represents density. Although the graphs look similar, this difference must be kept in mind when interpreting the two different kinds of graphs. **Science and Engineering Practice** 6. Constructing explanations and designing solutions 8. Obtaining, evaluating, and communicating information **Cross Cutting Concepts** 1.Pattern 3.Systems and System Models		**Evaluate** **Textbook** **No textbook adopted for this subject**

Physical World Concepts Quarter 3 Curriculum Map Curriculum Map Feedback Survey			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1 Motion and Stability: Forces and Interaction	Unit 2 Energy	**Unit 3** **Waves and Their Applications in Technologies for Information Transfer**	Unit 4 Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks

Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**			
Overarching Question(s)			
What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there?			
Unit, Lesson	**Lesson Length**	**Essential Question**	**Vocabulary**
Unit 3 **Waves and Their Applications in Technologies for Information Transfer**	**2 Weeks**	• Examine properties of light waves. • Investigate reflection, refraction, diffraction, and interference of light waves.	Reflection, angle of reflection, angle of incidence, virtual image, refraction, index of refraction

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**

DCI

PS4 Waves and Their Applications in Technologies for Information Transfer

Standard

PWC.PS4.7 Investigate reflection, refraction, diffraction, and interference of waves.

PWC.PS4.4 Explain the relationship between the wavelength of light absorbed or released by an atom or molecule and the transfer of a discrete amount of energy.

Misconceptions

- Only shiny materials reflect light.
- Shiny objects reflect more light than dull objects.
- Light always passes straight through transparent objects (without changing direction).
- The frequency of light changes as light enters a different medium

Science and Engineering Practice

8. Obtaining, evaluating, and communicating information

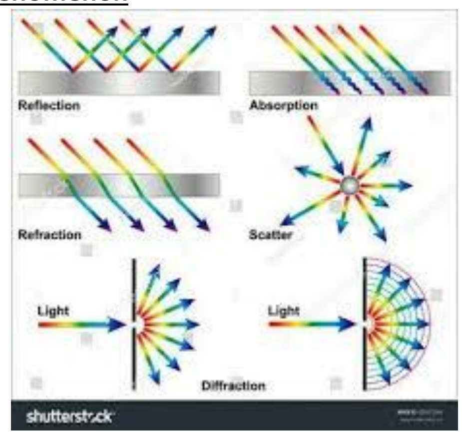
Cross Cutting Concepts

2. Cause and Effect

Learning Outcomes

- Distinguish between specular and diffuse reflection of light.
- Apply the law of reflection.
- Recognize situations in which refraction will occur.
- Identify which direction light will bend when it passes from one medium to another.
- Use Snell's law.

Phenomenon



Curricular Materials

Engage

Explore

Virtual Lab: Reflection and refraction

Explain

Elaborate

Evaluate

Textbook

No textbook adopted for this subject

Physical World Concepts Quarter 3 Curriculum Map Curriculum Map Feedback Survey			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1	Unit 2	**Unit 3**	Unit 4

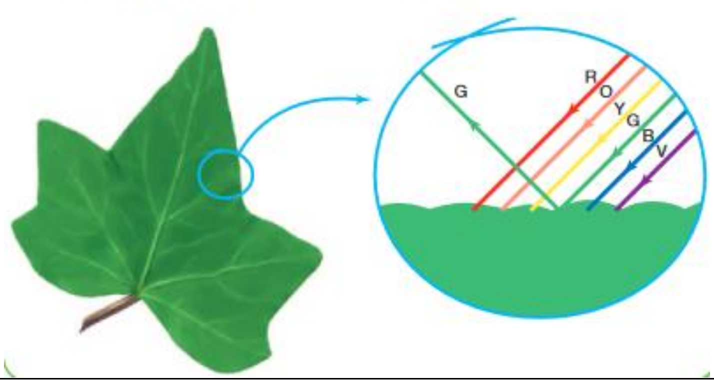
Motion and Stability: Forces and Interaction	Energy	**Waves and Their Applications in Technologies for Information Transfer**	Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks

Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**

Overarching Question(s)

What is light? How can one explain the varied effects that involve light?
What other forms of electromagnetic radiation are there?

Unit, Lesson	Lesson Length	Essential Question	Vocabulary
Unit 3 Waves and Their Applications in Technologies for Information Transfer	**2 Weeks**	• Why do objects appear to be different colors? • What determines the colors you see in nature?	Additive primary color, linear polarization

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI PS4 Waves and Their Applications in Technologies for Information Transfer **Standard** **PWC.PS4.5** Experimentally explore the additive and subtractive properties associated with color formation. **PWC.PS4.9** Analyze the application of polarization. **Misconceptions** • Color is a property of an object and is independent of both the illuminating light and the receiver (eye). • White light is colorless and clear, enabling you to see the "true" color of an object. • When white light passes through a colored filter color is added to the light.	**Learning Outcomes** • Explore the additive and subtractive properties associated with color formation. • Recognize how additive colors affect the color of light. • Recognize how pigments affect the color of reflected light • Explain how linearly polarized light is formed and detected. **Phenomenon** **Color and Reflection** A leaf appears green under white light because the primary pigment in the leaf reflects only green light. 	**Curricular Materials** **Engage** Animations and Simulations: Color Vision **Explore** Virtual Lab: Color Activity: Polarization **Explain** **Elaborate** **Evaluate** **Textbook** **No textbook adopted for this subject**

• When a colored light illuminates a colored object, the color of the light mixes with the color of the object **Science and Engineering Practice** 6. Constructing explanations and designing solutions 8. Obtaining, evaluating, and communicating information **Cross Cutting Concepts** 6. System and System Models		

Physical World Concepts Quarter 3 Curriculum Map [Curriculum Map Feedback Survey]			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1 Motion and Stability: Forces and Interaction	Unit 2 Energy	**Unit 3** **Waves and Their Applications in Technologies for Information Transfer**	Unit 4 Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks
Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**			
Overarching Question(s)			
What are the characteristic properties and behaviors of waves?			

Unit, Lesson	**Lesson Length**	**Essential Question**	**Vocabulary**
Unit 3 **Waves and Their Applications in Technologies for Information Transfer**	**1 Week**	• What is sound? • How is sound produced? • How does sound travel? • How does sound interact in our environment? • How is energy transformed into sound? • How do humans perceive ('hear') sound? • How do you describe differences in sound? • What materials and variables affect how you hear sound? • How do we describe the motion of waves? • How do the different forms of energy travel? • What affects how the different forms of energy travel?	compression, pitch, rarefaction

		• What are the properties of a compression wave? • How does the shape of an object (shape of room, dome, microphone, speaker etc.) impact hearing?	

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI PS4 Waves and Their Applications in Technologies for Information Transfer **Standard** **PWC.PS4.8** Explain what function sound resonance has in practical form. **Misconceptions** • frequency or intensity alone can determine which sounds are audible. **Science and Engineering Practice** 5. Using Mathematics and computational thinking 6. Constructing explanations and designing solutions **Cross Cutting Concepts** 3. Scale, Proportion, and Quantity	**Learning Outcomes** • Calculate the intensity of sound waves. • Relate intensity, decibel level, and perceived loudness. • Explain why resonance occurs. • Learning Outcomes Explain how sound waves are produced. • Relate frequency to pitch. • Compare the speed of sound in various media **Phenomenon**  **https://youtu.be/7bx3xx7sB0c**	**Curricular Materials** **Engage** **Explore** Lab: Longitudinal wave Lab: Speed of Sound in Air Web resource: Sound and Music Lab **Explain** **Elaborate** **Evaluate** **Textbook** **No textbook adopted for this subject**

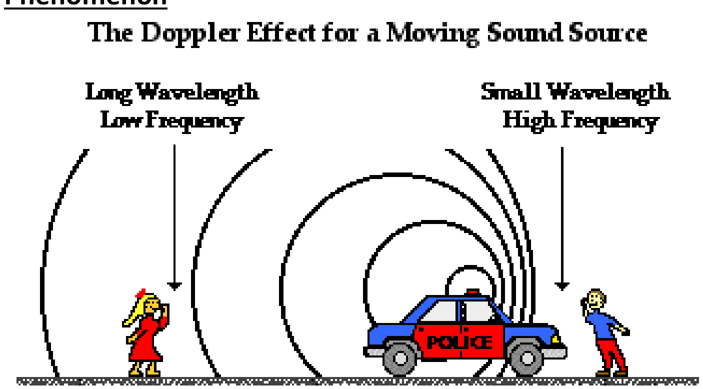
Physical World Concepts Quarter 3 Curriculum Map Curriculum Map Feedback Survey			
Quarter 1	Quarter 2	**Quarter 3**	Quarter 4
Unit 1 Motion and Stability: Forces and Interaction	Unit 2 Energy	**Unit 3** **Waves and Their Applications in Technologies for Information Transfer**	Unit 4 Matter and Its Interactions
9 weeks	9 weeks	**9 weeks**	9 weeks
Unit 3: Waves and Their Applications in Technologies for Information Transfer **[9 Weeks]**			

<table>
<tr><th colspan="4">Overarching Question(s)</th></tr>
<tr><td colspan="4">What are the characteristic properties and behaviors of waves?</td></tr>
<tr><th>Unit, Lesson</th><th>Lesson Length</th><th>Essential Question</th><th>Vocabulary</th></tr>
<tr><td>Unit 3
Waves and Their Applications in Technologies for Information Transfer</td><td>1 Week</td><td>What aspects of sound quality are affected by how the waves travel?
What do you notice as a fire truck passes by you with its siren on?</td><td>Intensity, decibel, resonance, fundamental frequency, timbre, harmonic series, beat</td></tr>
<tr><th colspan="2">Standards and Related Background Information</th><th>Instructional Focus</th><th>Instructional Resources</th></tr>
<tr><td colspan="2"><u>DCI</u>
PS4 Waves and Their Applications in Technologies for Information Transfer.

<u>Standard</u>
PWC.PS4.6 Use real world application, explain the principle of the Doppler Effect. Explanation

<u>Misconceptions</u>
The observed frequency increases as the object approaches an observer and then decreases only as the object passes the observer.

<u>Science and Engineering Practice</u>
5. Using Mathematics and computational thinking
6. Constructing explanations and designing solutions

<u>Cross Cutting Concepts</u>
1. Stability and Change
2. Energy and Matter
3. Scale, Proportion, and Quantity</td><td><u>Learning Outcomes</u>
Calculate the intensity of sound waves.
Relate intensity, decibel level, and perceived loudness.
Explain why resonance occurs.
Recognize the Doppler effect and determine the direction of a frequency shift when there is relative motion between a source and an observer.
Differentiate between the harmonic series of open and closed pipes.
Calculate the harmonics of a vibrating string and of open and closed pipes.
Relate the frequency difference between two waves to the number of beats heard per second.
<u>Phenomenon</u>

</td><td><u>Curricular Materials</u>
<u>Engage</u>

<u>Explore</u>
Virtual Lab: <u>Speed of Sound</u>
Activity: <u>Sound of Music</u>

<u>Explain</u>

<u>Elaborate</u>

<u>Evaluate</u>

<u>Textbook</u>
No textbook adopted for this subject</td></tr>
</table>

No textbook for this subject		
RESOURCE TOOLKIT		
Quarter 2	**Physical World Concept**	
DCIs PS4 Waves and Their Applications in Technologies for Information Transfer **Standard(s)** PWC.PS4.1 PWC.PS4.2 PWC.PS4.3 PWC.PS4.7 PWC.PS4.4 PWC.PS4.5 PWC.PS4.9 PWC.PS4.8 PWC.PS4.6	**Websites/ Videos** **Lab: Wave, frequency and Amplitude:** **https://phet.colorado.edu/en/simulation/wave-on-a-string** **Lab:** longitudinal and transverse wave: http://www.westerville.k12.oh.us/userfiles/4161/Classes/9094/Slinky%20Wave%20Lab.pdf **Animation**: longitudinal and transverse wave: https://www.youtube.com/watch?v=7cDAYFTXq3E **Virtual Lab:** Reflection and refraction: https://phet.colorado.edu/en/simulation/bending-light **Virtual Lab**: Color: https://www.golabz.eu/lab/color-vision **Animations and Simulations**: https://phet.colorado.edu/sims/html/color-vision/latest/color-vision_en.html **Activity: Polarization**: https://www.physicsclassroom.com/NGSS-Corner/Activity-Descriptions/Polarization **Web resource:** http://www.physicsclassroom.com/lab/sound/Slabs.cfm **Lab: Longitudinal wave:** http://www.physicsclassroom.com/lab/waves/Wlabs.cfm **Lab: speed of sound in air:** http://www.physicsclassroom.com/lab/sound/Slabs.cfm **Virtual Lab:** https://my.hrw.com/content/hmof/science/hss2017/tn/gr9-12/hmd_phy_9781328833716_/nsmedia/polyhedron_virtual_labs/speedofsound/soshomeframeset.html **Activity: Sound of Music:** https://www.physicsclassroom.com/NGSS-Corner/Activity-Descriptions/The-Sound-of-Music	**Additional Resources** **ACT & SAT** TN ACT Information & Resources ACT College & Career Readiness Mathematics Standards SAT Connections SAT Practice from Khan Academy Khan Academy Illuminations (NCTM)