A Correlation of

Elevate Science Modules

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To the

New Jersey Science Module Curriculum

Grade 8

Pearson

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To the
New Jersey Science Model Curriculum, Grade 8

Introduction

This document demonstrates how ***Elevate Science Modules ©2019*** meets the New Jersey Science Model Curriculum. Correlation page references are to the Student and Teacher's Editions and cited at the page level. Pearson is proud to introduce ***Elevate Science Modules*** for Middle Grades – where exploration is the heart of science! Designed to address the rigors of new science standards, students will experience science up close and personal, using real-world, relevant phenomena to solve project-based problems. Our newest program prepares students for the challenges of tomorrow, building strong reasoning skills and critical thinking strategies as they engage in explorations, formulate claims, and gather and analyze data that promote evidence-based arguments. The blended print and digital curriculum covers all Next Generation Science Standards at every grade level.

Elevate Science helps teachers transform learning, promote innovation, and manage their classroom.

Transform science classrooms by immersing students in active, three-dimensional learning.
Elevate Science engages students with real-world tasks, open-ended Quests, uDemonstrate performance-based labs, and in the engineering/design process with uEngineer It! investigations.

- A new 3-D learning model enhances best practices.
- Engineering-focused features infuse STEM learning.
- Phenomena-based activities put students at the heart of a Quest for knowledge.

Innovate learning by focusing on 21st century skills.
Students are encouraged to think, collaborate, and innovate! With ***Elevate Science***, students explore STEM careers, experience engineering activities, and discover our scientific and technological world. The content, strategies, and resources of Elevate Science equip the science classroom for scientific inquiry and science and engineering practices.

- Problem-based learning Quests put students on a journey of discovery.
- STEM connections help integrate curriculum.
- Coding and innovation engage students and build 21st century skills.

Manage the classroom with confidence.
Teachers will lead their class in asking questions and engaging in argumentation. Evidence-based assessments provide new options for monitoring student understanding.

- Professional development offers practical point-of-use support.
- Embedded standards in the program allow for easy integration.
- ELL and differentiated instruction strategies help instructors reach every learner.
- Interdisciplinary connections relate science to other subjects.

Designed for today's classroom, preparing students for tomorrow's world. ***Elevate Science*** promises to:

- Elevate thinking.
- Elevate learning.
- Elevate teaching.

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Unit Summary	
How do we know when an organism (fossil) was alive? ***How do we know that birds and dinosaurs are related?*** In this unit of study, students analyze graphical displays and gather evidence from multiple sources in order to develop an understanding of how fossil records and anatomical similarities of the relationships among organisms and species describe biological evolution. Students search for patterns in the evidence to support their understanding of the fossil record and how those patterns show relationships between modern organisms and their common ancestors. The crosscutting concepts of *cause and effect, patterns*, and *structure and function* are called out as organizing concepts for these disciplinary core ideas. Students use the practices of *analyzing graphical displays* and *gathering, reading, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-LS4-1, MS-LS4-2, and MS-LS4-3.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Systems, Reproduction, and Growth** **Topic 1: Living Things in the Biosphere** Lesson 2: Classification Systems **Module: Diversity of Life** **Topic 2: Natural Selection and Change over Time** Lesson 4: Evidence in the Fossil Record Case Study: Could Dinosaurs Roar? Lesson 5: Other Evidence of Evolution
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Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (MS-LS4-1)	**Module: Diversity of Life** **Topic 2: Natural Selection and Change over Time** **SE/TE:** uConnect Lab: Walking Whales, 66 The Essential Question, 67 Quest Kickoff: Why is the migration pattern changing for some European bird populations?, 68-69 Connect It!, 98 Document: Choose the Right Organism, 99 The Fossil Record, 99-101 uInvestigate Lab: Finding Proof, 101

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Unit Summary	
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Student Learning Objectives	
Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (MS-LS4-4)	**Module: Diversity of Life** **Topic 1: Genes and Heredity** Case Study: Cephalopods Special Edition, 14-15 Diversity of Life, 37 Chromosomes and Variations, 38-39 uInvestigate Lab: Observing Traits, 38 Types of Mutations, 41-42 Environmental Factors, 42-43 Mutations in Reproduction, 44-46 Lesson 4 Check, 46

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Unit 3: Stability and Change on Earth	
Unit Summary	
Why aren't minerals and groundwater distributed evenly across the world? Students construct an understanding of the ways that human activities affect Earth's systems. Students use practices to understand the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts on the development of these resources. Students also understand that the distribution of these resources is uneven due to past and current geosciences processes or removal by humans. The crosscutting concepts of *patterns, cause and effect*, and *stability and change* are called out as organizing concepts for these disciplinary core ideas. In this unit of study students are expected to demonstrate proficiency in *asking questions, analyzing and interpreting data, constructing explanations, and designing solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-ESS3-1, MS-ESS3-2, MS-ESS3-4, and MS-ESS3-5.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Changing Earth and Human Activity** **Topic 1: Earth's Surface Systems** Lesson 2: Erosion and Deposition **Topic 2: Distribution of Natural Resources** Lesson 1: Nonrenewable Energy Resources Lesson 2: Renewable Energy Resources Lesson 3: Mineral Resources Case Study: Phosphorus Fiasco Lesson 4: Water Resources **Topic 3: Human Impacts on the Environment** Lesson 1: Population Growth and resource Consumption Lesson 2: Air Pollution Lesson 3: Impacts on Land Case Study: Nothing Goes to Waste Lesson 4: Water Pollution **Module: Cycles Influencing Weather and Climate** **Topic 1: Weather in the Atmosphere** Lesson 1: The Atmosphere Around You Lesson 5: Severe Weather and Floods Case Study: The Case of the Runaway Hurricane

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Student Learning Objectives	
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Unit 4: Human Impacts	
Unit Summary	
How do we monitor the health of the environment (our life support system)? ***Is it possible to predict and protect ourselves from natural hazards?*** In this unit of study, students analyze and interpret data and design solutions to build on their understanding of the ways that human activities affect Earth's systems. The emphasis of this unit is the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts of these uses. The crosscutting concepts of *cause and effect* and *the influence of science, engineering, and technology on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Building on Unit 3, students define a problem by precisely specifying criteria and constraints for solutions as well as potential impacts on society and the natural environment; systematically evaluate alternative solutions; analyze data from tests of different solutions; combining the best ideas into an improved solution; and develop and iteratively test and improve their model to reach an optimal solution. In this unit of study students are expected to demonstrate proficiency in *analyzing and interpreting data* and *designing solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-ESS3-3, MS-ETS1-1, MS-ETS1-2, and MS-ETS1-3.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Changing Earth and Human Activity** **Topic 1: Earth's Surface Systems** Lesson 1: Weathering and Soil Lesson 2: Erosion and Deposition Lesson 3: Water Erosion **Topic 2: Distribution of Natural Resources** Lesson 1: Nonrenewable Energy Sources Lesson 2: Renewable Energy Resources Lesson 3: Mineral Resources **Topic 3: Human Impacts on the Environment** Lesson 1: Population Growth and Resource Consumption Lesson 2: Air Pollution Lesson 3: Impacts on Land Lesson 4: Water Pollution

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Student Learning Objectives	
Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3)	**Module: Changing Earth and Human Activity** **Topic 2: Distribution of Natural Resources** **SE/TE:** Reducing Fossil Fuel Usage, 67 Interactivity: Renewable Resources in Your Community, 67 Alternative Sources of Energy, 68-71 Interactivity: Using Renewable Resources, 69 uInvestigate Lab: The Power of Wind, 70 Lesson 2 Check, 72 uEngineer It! Sustainable Design STEM: Micro-Hydro Power, 73 **Realize™ Digital Resources:** Distribution of Natural Resources>Lesson 2, Renewable Energy>uInvestigate Lab: The Power of Wind; Interactivity: Biogas Farming; Interactivity: Renewable Resource Ranges; Distribution of Natural Resources>Engineering Video
Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-1)	**Module: Changing Earth and Human Activity** **Realize™ Digital Resources:** (Supporting Content:) Earth's Surface Systems>Lesson 1> Inquiry Warm-up Lab: Breaking Up is Hard to Do, Lesson 2>Interactivity >Predicting Disasters, Lesson 2> Virtual Lab: Save the Town, Lesson 3 >Inquiry Warm-up Lab: Glacier in a up. Distribution of Natural Resources>Lesson 1>uInvestigate Lab: Fossil Fuels; Lesson 2>uEngineer it! Micro-Hydro Power; Lesson 4>uInvestigate Lab: An Artesian Well Human Impacts on the Environment>Topic Launch>Finding a Solution for Your Pollution; Lesson 2>uInvestigate Lab: It's all in the Air; Lesson 3>uInvestigate Lab: Mining Matters; Lesson 4> uInvestigate Lab: Getting Clean.

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Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)	**Module: Changing Earth and Human Activity** **Realize™ Digital Resources:** Earth's Surface Systems>Topic Launch> uConnect Lab: How does Gravity Affect Materials on a Slope?; Earth's Surface Systems>Lesson 1> Inquiry Warm-up Lab: Breaking Up is Hard to Do; Earth's Surface Systems>Lesson 2>Predicting Disasters Human Impacts on the Environment>Topic Launch>Finding a Solution for Your Pollution
Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3)	**Module: Changing Earth and Human Activity** **Realize™ Digital Resources:** Earth's Surface Systems>Lesson 1> Inquiry Warm-up Lab: Breaking Up is Hard to Do, Lesson 2>Interactivity >Predicting Disasters, Lesson 2> Virtual Lab: Save the Town, Lesson 3 >Inquiry Warm-up Lab: Glacier in a up. Human Impacts on the Environment>Topic Launch>Finding a Solution for Your Pollution

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Unit 5: Relationships among Forms of Energy	
Unit Summary	
How can physics explain sports? In this unit, students use the practices of *analyzing and interpreting data*, *developing and using models*, and *engaging in argument from evidence* to make sense of relationship between energy and forces. Students develop their understanding of important qualitative ideas about the conservation of energy. Students understand that objects that are moving have kinetic energy and that objects may also contain stored (potential) energy, depending on their relative positions. Students also understand the difference between energy and temperature, and the relationship between forces and energy. The crosscutting concepts of *scale, proportion, and quantity*, *systems and system models*, and *energy and matter* are called out as organizing concepts for these disciplinary core ideas. Students use the practices of *analyzing and interpreting data*, *developing and using models*, and *engaging in argument from evidence*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-PS3-1, MS-PS3-2, and MS-PS3-5.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Energy Transfer** **Topic 1: Energy** Lesson 2: Kinetic Energy and Potential Energy Lesson 3: Other Forms of Energy Lesson 4: Energy Change and Conservation Case Study: U.S. Energy Consumption **Topic 2: Thermal Energy** Lesson 2: Heat Transfer Case Study: Earth's Power Lesson 3: Heat and Materials **Module: Forces** **Topic 1: Forces and Motion** Lesson 4: Friction and Gravitational Interactions **Topic 2: Electricity and Magnetism** Lesson 1: Electric Force Lesson 2: Magnetic Force

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Student Learning Objectives	
Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. (MS-PS3-1)	**Module: Energy Transfer** **Topic 1: Energy** **SE/TE:** uConnect Lab: What Would Make a Card Jump?, 0 Calculating Kinetic Energy, 16 uInvestigate Lab: Mass, Velocity, and Kinetic Energy, 16 Lesson 2 Check, 20 Topic 1 Review and Assess, 42-43 **Realize™ Digital Resources:** Energy> Lesson 2, Kinetic Energy and Potential Energy>Interactivity>Interpret Kinetic Energy Graphs; Video: Kinetic Energy and Potential Energy; uInvestigate Lab: Mass, Velocity, and Kinetic Energy; Interactivity: Racing for Kinetic Energy
Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (MS-PS3-2)	**Module: Energy Transfer** **Topic 1: Energy** **SE/TE:** uConnect Lab: What Would Make a Card Jump?, 0 Quest Kickoff: How can you build a complicated machine to do something simple? 2-3 uInvestigate Lab: Mass, Velocity, and Kinetic Energy, 16 Interactivity: Racing for Kinetic Energy. 17 uInvestigate Lab: Energy, Electricity, and Magnetism, 18 Lesson 2 Check, 20 Quest Check-In Lab: Build a Chain-Reaction Machine, 20 Quest Check-In Lab: Test and Evaluate a Chain-Reaction Machine, 30 Quest Check-In Lab: Redesign and Retest a Chain-Reaction Machine, 39

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(Continued)	**(Continued)** Topic 1 Review and Assess, 42-43 Evidence-Based Assessment, 44-45 Quest Findings: Complete the Quest!, 45 uDemonstrate Lab: 3, 2, 1 . . .Liftoff, 46-49 **Realize™ Digital Resources:** Energy>Topic Launch>Quest Kickoff>Video: Outrageous Energy Contraptions; Energy> Lesson 2, Kinetic Energy and Potential Energy> uInvestigate Lab: Mass, Velocity, and Kinetic Energy; uInvestigate Lab: Energy, Magnetism, and Electricity; Interactivity: Roller Coasters and Potential Energy; Energy>Topic Close>Quest Findings>Interactivity: Reflect on Your Chain-Reaction Machine; uDemonstrate Lab: 3, 2, 1 . . .Liftoff **Module: Forces** **Topic 1: Forces and Motion** **SE/TE:** uConnect Lab: Identifying Motion, 0 uInvestigate Lab: Observing Friction, 37 Model It!: Develop Models, 41 Lesson 4 Check, 42 Topic 1 Review and Assess, 44-45 uDemonstrate Lab: Stopping on a Dime, 48-51 **Module: Forces** **Topic 2: Electricity and Magnetism** **SE/TE:** TE Only, Focus on Mastery: Develop Models, 53 Quest Kickoff: How can you lift an object without making contact?, 54-55

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(Continued)	**(Continued)**uInvestigate Lab: Detecting Charges, 63 Lesson 1 Check, 64 uInvestigate Lab: Detecting Fake Coins, 68 Model It!: Combined Magnetic Field Lines, 71 Lesson 2 Check, 73 Quest Check-In Lab: Tracking Levitation, 73 Quest Check-In Lab: Electrifying Levitation, 91 Topic 2 Review and Assess, 94-95 Evidence-Based Assessment, 96-97 Quest Findings: Complete the Quest!, 97 uDemonstrate Lab: Planetary Detective, 98-101 **Realize™ Digital Resources:** Electricity and Magnetism>Topic Launch>Quest Kickoff>Video: Light as a Feather; Electricity and Magnetism>Lesson 2, Magnetic Force>Virtual Lab: Get Your Bearings; uInvestigate Lab: Detecting Charges; uInvestigate Lab: Detecting Fake Coins; Interactivity: Modeling Magnetic Forces; Electricity and Magnetism>Topic Close>Quest Findings>Interactivity: Reflect on Your Levitating Device; uDemonstrate Lab: Planetary Detective

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Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5)	**Module: Energy Transfer** **Topic 1: Energy** **SE/TE:** Quest Kickoff: How can you build a complicated machine to do something simple? 2-3 Quest Check-In Lab: Build a Chain-Reaction Machine, 20 Interactivity: Forms of Energy, 24 uInvestigate Lab: Making a Flashlight Shine, 25 Energy at the Cookout, 28-29 Lesson 3 Check, 30 Quest Check-In Lab: Test and Evaluate a Chain-Reaction Machine, 30 Interactivity: Everyday Energy Transformations, 33 Model It!: Transformation and Transfer in Demolition, 35 uInvestigate Lab: Law of Conservation of Energy, 37 Interactivity: Take It to the Extreme, 38 Lesson 4 Check, 39 Quest Check-In Lab: Redesign and Retest a Chain-Reaction Machine, 39 Case Study: U.S. Energy Consumption, 40-41 Topic 1 Review and Assess, 42-43 Evidence-Based Assessment, 44-45 Quest Findings: Complete the Quest!, 45 uDemonstrate Lab: 3, 2, 1 . . .Liftoff, 46-49

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(Continued)	**(Continued)** **Realize™ Digital Resources:** Energy>Topic Launch>uConnect Lab: What Would Make a Card Jump?; Quest Kickoff>Video>Outrageous Energy Contraptions; Lesson 3, Other Forms of Energy>Interactivity: Other Forms of Energy; uInvestigate Lab: Making a Flashlight Shine; Lesson 4, Energy Change and Conservation>Interactivity: Everyday Energy Transformations; Interactivity: Energy Transformations; uInvestigate Lab: Law of Conservation of Energy; Quest Check-In Lab: Redesign and Retest a Chain-Reaction Machine; Energy>Topic Close>Quest Findings>Complete the Quest>Interactivity>Reflect on Your Chain-Reaction Machine; uDemonstrate Lab: 3, 2, 1, . . . Liftoff! **Module: Energy Transfer** **Topic 2: Thermal Energy** **SE/TE:** Case Study: Earth's Power, 70-71 Friction and Energy Transformation, 76 Model It!: Friction and Energy Transformation, 76 Materials for Space Shuttles, 77 Plan It!: Materials for Airplanes, 78 Lesson 3 Check, 79 Topic 2 Review and Assess, 80-81 Evidence-Based Assessment, 82-83

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Unit 6: Thermal Energy	
Unit Summary	
How can a standard thermometer be used to tell you how particles are behaving? In this unit, students *ask questions*, *plan and carry out investigations*, *engage in argument from evidence*, *analyze and interpret data, construct explanations*, *define problems and design solutions* as they make sense of the difference between energy and temperature. They use the practices to make sense of how the total change of energy in any system is always equal to the total energy transferred into or out of the system. The crosscutting concepts of *energy and matter, scale, proportion, and quantity*, and *influence of science, engineering, and technology on society and the natural world* are the organizing concepts for these disciplinary core ideas. Students ask *questions*, *plan and carry out investigations*, *engage in argument from evidence*, *analyze and interpret data*, *construct explanations*, *define problems and design solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-PS3-3, MS-PS3-4, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, and MS-ETS1-4.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Energy Transfer** **Topic 2: Thermal Energy** Lesson 1: Thermal Energy, Heat, and Temperature Lesson 2: Heat Transfer Case Study: Earth's Power Lesson 3: Heat and Materials

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Student Learning Objectives	
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-3)	**Module: Energy Transfer** **Topic 2: Thermal Energy** **SE/TE:** uConnect Lab: How Cold Is Water? 50 Quest Kickoff: How can you keep hot water from cooling down? 52-53 Quest Check-In Lab: Keep the Heat In, 79 Topic 2 Review and Assess, 80-81 Quest Findings: Complete the Quest!, 83 uDemonstrate Lab: testing Thermal Conductivity, 84-87 **Realize™ Digital Resources:** Thermal Energy>Topic Launch>Quest Kickoff>Video>Keep Hot Liquids Hot; Thermal Energy>Topic Close>Quest Findings>Complete the Quest!>Interactivity>Reflect on Your Insulating Container

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Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. (MS-PS3-4)	**Module: Energy Transfer** **Topic 2: Thermal Energy** **SE/TE:** uConnect Lab: How Cold Is Water? 50 uInvestigate Lab: Temperature and Thermal Energy, 56 Lesson 1 Check, 61 uInvestigate Lab: Visualizing Convection Currents, 64 Question It!, 67 Lesson 2 Check, 68 Case Study: Earth's Power, 70-71 uInvestigate Lab: Comparing How Liquids Cool, 74 Lesson 3 Check, 79 Topic 2 Review and Assess, 80-81 Evidence-Based Assessment, 82-83 uDemonstrate Lab: testing Thermal Conductivity, 84-87 **Realize™ Digital Resources:** Thermal Energy> Lesson 1, Thermal Energy, Heat, and Temperature>Interactivity: Flow of Thermal Energy; uInvestigate Lab: Temperature and Thermal Energy; Lesson 2, Heat Transfer>Interactivity: Methods of Thermal Energy Transfer; uInvestigate Lab: Visualizing Convection Currents; Lesson 3, Heat and Materials>Interactivity: Too Hot to Handle; uInvestigate Lab: Comparing How Liquids Cool; Interactivity: Solar Oven Design; Interactivity: Matter and Heat Transfer; Thermal Energy>Topic Close>uDemonstrate Lab: Testing Thermal Conductivity

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Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-1)	Engineering standards are incorporated into Labs, Interactivities, and digital assets throughout the Module program. Examples of supporting content in the module **Energy Transfer** include: **SE/TE:** uConnect Lab: How Cold Is Water? 50 uInvestigate Lab: Temperature and Thermal Energy, 56 uInvestigate Lab: Visualizing Convection Currents, 64 uInvestigate Lab: Comparing How Liquids Cool, 74 Quest Check-in Lab: Keep the Heat In, Keep the Cold Out, 79 **Realize™ Digital Resources:** Thermal Energy> Lesson 1, Thermal Energy, Heat, and Temperature>Choosing a Snack Food; Thermal Energy>Lesson 2, Heat Transfer>Interactivity/Worksheet: Solar Oven Design; Thermal Energy, Topic 3: Quest Check-In Lab: Keep the Heat In, Keep the Cold Out.
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)	**Module: Energy Transfer, Topic 2: Thermal Energy** **SE/TE:** Model it!, 58 Plan-It!: Materials for Airplanes, 78 Quest Check-in Lab: Keep the Heat In, Keep the Cold Out, 79 Testing Thermal Energy, 84-87 **Realize™ Digital Resources:** Thermal Energy>Topic Launch>uConnect Lab: How Cold is the Water?; Thermal Energy>Lesson 2, Heat Transfer>Interactivity/Worksheet: Solar Oven Design; Thermal Energy, Topic 3: Quest Check-In Lab: Keep the Heat In, Keep the Cold Out.

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Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3)	**Module: Energy Transfer, Topic 2: Thermal Energy** **SE/TE:** Question It!, 67 Plan-It!: Materials for Airplanes, 78 Quest Check-in Lab: Keep the Heat In, Keep the Cold Out, 79 **Realize™ Digital Resources:** Thermal Energy>Lesson 2, Heat Transfer>Interactivity/Worksheet: Solar Oven Design; Thermal Energy, Topic 3: Quest Check-In Lab: Keep the Heat In, Keep the Cold Out; Thermal Energy>Topic Close>Quest Findings: Reflect on Your Insulated Container
Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4)	**Module: Energy Transfer, Topic 2: Thermal Energy** **SE/TE:** Math Toolbox: Graphing Changes in Temperature, 65 Plan-It!: Materials for Airplanes, 78 Quest Check-in Lab: Keep the Heat In, Keep the Cold Out, 79 Testing Thermal Energy, 84-87 **Realize™ Digital Resources:** Thermal Energy>Lesson 2, Heat Transfer>Interactivity/Worksheet: Solar Oven Design; Thermal Energy, Topic 3: Quest Check-In Lab: Keep the Heat In, Keep the Cold Out.

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Unit 7: The Electromagnetic Spectrum	
Unit Summary	
How do cell phones work? In this unit of study, students *develop and use models, use mathematical thinking,* and *obtain, evaluate, and communicate information* in order to describe and predict characteristic properties and behaviors of waves. Students also apply their understanding of waves as a means of sending digital information. The crosscutting concepts of *patterns* and *structure and function* are used as organizing concepts for these disciplinary core ideas. Students *develop and use models, use mathematical thinking,* and *obtain, evaluate, and communicate information.* Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on MS-PS4-1, MS-PS4-2, and MS-PS4-3.	**This unit is addressed in the following Module (s), Topic(s), and Lessons in Elevate Science:** **Module: Waves and Information Technologies** **Topic 1: Waves and Electromagnetic Radiation** Lesson 1: Wave Properties Case Study: Sound and Light at the Ballpark Lesson 2: Wave Interactions Lesson 3: Sound Waves Lesson 4: Electromagnetic Waves Lesson 5: Light **Topic 2: Information Technologies** Lesson 1: Electric Circuits Lesson 2: Signals Case Study: Super Ultra High Definition Lesson 3: Communication and Technology

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Student Learning Objectives	
Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS4-1)	**Module: Waves and Information Technologies** **Topic 1: Waves and Electromagnetic Radiation** **SE/TE:** Quest Kickoff: How can you design a system to stop a thief?, 2-3 Transverse Waves, 6 Longitudinal Waves, 7 Properties of Waves, 8-9 uInvestigate Lab: Waves and Their Characteristics, 8 Math Toolbox: Wave Properties, 10 Lesson 1 Check, 11 Quest Check-In Lab: An Optimal Optical Solution, 53 Topic 1 Review and Assess, 54-55 Evidence-Based Assessment, 56-57 Quest Findings: Complete the Quest!, 57 **Realize™ Digital Resources:** Waves and Electromagnetic Radiation>Topic Launch>Quest Kickoff>Video>Design to Stop a Thief; Lesson 1, Wave Properties>Interactivity: Reactive Ripples; Interactivity: Describe the Properties of Waves; Interactivity: Modeling Waves; Lesson 4, Electromagnetic Waves>Interactivity: Describe Electromagnetic Waves; Waves and Electromagnetic Radiation>Topic Close>Quest Findings>Complete the Quest!>Interactivity>Reflect on Your Demonstration

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Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS4-2)	**Module: Waves and Information Technologies** **Topic 1: Waves and Electromagnetic Radiation** **SE/TE:** uConnect Lab: What Are Waves?, 0 Quest Kickoff: How can you design a system to stop a thief?, 2-3 Case Study: Sound and Light at the Ballpark, 12-13 Reflection, 15 Plan It!: Develop Models, 16 uInvestigate Lab: Standing Waves and Wave Interference, 18 Types of Interference, 18-19 Interactivity: Model Wave Interactions, 19 Standing Waves, 20 Interactivity: Use Models to Describe Wave Behavior, 21 Lesson 2 Check, 22 uEngineer It! Impact on Society STEM: Say "Cheese!", 23 Inquiry Warm-Up Lab: Amplitude and Loudness, 25 Model It!: Develop Models, 27 uInvestigate Lab: Understanding Sound, 27 The Doppler Effect, 32 Lesson 3 Check, 33 Interactivity: Build an Electromagnetic Wave, 36 Model It!: Polarizing Glasses, 37 Interactivity: Models of Light, 37 uInvestigate Lab: Build a Wave, 40 Lesson 4 Check, 42 Interactivity: Describe the Behavior of Light, 46 uInvestigate Lab: Light Interacting with Matter, 48 Model It!: Fun with Mirrors, 50 Concave Lenses, 52 Lesson 5 Check, 53

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(Continued)	**(Continued)** Quest Check-In Lab: An Optimal Optical Solution, 53 Topic 1 Review and Assess, 54-55 Evidence-Based Assessment, 56-57 Quest Findings: Complete the Quest!, 57 uDemonstrate Lab: Making Waves, 58-61 **Realize™ Digital Resources:** Waves and Electromagnetic Radiation>Topic Launch>Quest Kickoff>Video>Design to Stop a Thief; Lesson 2, Wave Interactions>Interactivity: Model Wave Interactions; Virtual Lab: Colors of the Sky; uInvestigate Lab: Standing Waves and Wave Interference; Interactivity: Use Models to Describe Wave Behavior; Lesson 3, Sound Waves>Interactivity: Reflection, Transmission, and Absorption of Sound Waves; uInvestigate Lab: Understanding Sound; Lesson 4, Electromagnetic Waves>Interactivity: Build an Electromagnetic Wave; Interactivity: Models of Light; uInvestigate Lab: Build a Wave; Interactivity: Describe Electromagnetic Waves; Lesson 5, Light>uInvestigate Lab: Light Interacting with Matter; Interactivity: Predicting the Behavior of Light; Waves and Electromagnetic Radiation>Topic Close>Quest Findings>Complete the Quest!>Interactivity>Reflect on Your Demonstration; uDemonstrate Lab: Making Waves

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Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (MS-PS4-3)	**Module: Waves and Information Technologies** **Topic 2: Information Technologies** **SE/TE:** uConnect Lab: Continuous or Discrete?, 62 STEM Quest Kickoff: What is the best way to record sound for my scenario?, 64-65 Inquiry Warm-Up Lab: Do the Lights Keep Shining?, 67 uInvestigate Lab: Electric Current and Voltage, 70 Lesson 1 Check, 74 Quest Check-In Lab: Constructing a Microphone, 74 uEngineer It! Prototype to Product STEM: A Life-Saving Mistake, 75 Analog and Digital Signals, 80-82 Interactivity: Analog and Digital Signals, 81 uInvestigate Lab: Constructing a Simple Computer Circuit, 82 Transmitting Signals, 83-84 Interactivity: I've Got to Take This Call, 83 Interactivity: Digitized Images, 84 Lesson 2 Check, 85 Case Study: Super Ultra High Definition, 86-87 The Information Age, 89-90 Interactivity: Technology and Communication, 90 Communication Systems, 91-94 Advantages of Digital Signals, 94-95 uInvestigate Lab: Let the Music Play, 94 Interactivity: Signal Reliability, 95 Lesson 3 Check, 96 Topic 2 Review and Assess, 98-99 Evidence-Based Assessment, 100-101 Quest Findings: Complete the Quest!, 101 uDemonstrate Lab: Over and Out, 102-105

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(Continued)	**(Continued)** **Realize™ Digital Resources:** Information Technologies>Topic Launch>Quest Kickoff>Video: Testing, Testing . . .1, 2, 3; Information Technologies>Lesson 1, Electric Circuits> uInvestigate Lab: Electric Current and Voltage; Lesson 2, Signals>Interactivity: Analog and Digital Signals; Video: Signals; uInvestigate Lab: Constructing a Simple Computer Circuit; Interactivity: I've Got to Take This Call; Interactivity: Digitized Images; Lesson 3, Communication and Technology>Interactivity: Technology and Communication; uInvestigate Lab: Let the Music Play; Interactivity: Signal Reliability; Information Technologies>Topic Close>Quest Findings>Interactivity: Reflect on Your Recording Method; uDemonstrate Lab: Over and Out