A Correlation of

Elevate Science
Physical, ©2019

To the

Colorado
Academic Standards for Science 2020
Middle School Physical Science

Prepared by Savvas Learning Company, formerly Pearson K12 Learning.

Introduction

This document demonstrates how ***Elevate Science ©2019*** meet the Colorado Academic Standards for Science 2020 for Middle School. Correlation page references are to the Student and Teacher Editions and cited at the page level.

Elevate Science 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.

A Correlation of Elevate Science: Physical ©2019 to the
Colorado Academic Standards for Science 2020
Middle School Physical Science

Table of Contents

Grade Level Expectations:

A Correlation of Elevate Science: Physical ©2019 to the Colorado Academic Standards for Science 2020 Middle School Physical Science

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
1. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.	
Grade Level Expectations:	
1. The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter and phases changes.	
Evidence Outcomes:	
Students Can:	
Develop models to describe the atomic composition of simple molecules and extended structures. (MS PS1-1) (Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3-D ball and stick structures, or computer representations showing different molecules with different types of atoms.) (Boundary Statement: Does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure.)	**SE/TE:** Describing and Classifying Matter, 4–12 Topic 1 Review and Assess, 36–37 Atomic Theory, 334–343 Case Study-Unlocking the Power of the Atom, 344–345 The Periodic Table, 346–367 Types of Bonds, 368–377 uDemonstrate Lab-Shedding Light on Ions, 390–393
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2) (Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.) (Boundary statement: Limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability and odor.)	**SE/TE:** Describing and Classifying Matter, 4–12 Quest Check-in, 357 Evidence of Chemical Reactions, 412–413 Connect It!, 420 Model It!, 422 Interactivity, 423 Quest Check-In 427 Topic 9 Review and Assess 438–439 uDemonstrate Lab-Evidence of Chemical 9-9-9-9-Change, 442–445
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (MS-PS1-3) (Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods and alternative fuels.) (Boundary Statement: Limited to qualitative information.)	**SE/TE:** Producing Useful Materials, 428–435 Case Study-Is Plastic Really Fantastic?, 436–437 Topic 9 Review and Assess, 439

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. (MS-PS1-4) (Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide and helium.)	**SE/TE:** Solids, Liquids, and Gases 42–43 Quest-How can you use solids, liquids, and gases to lift a car?, 44–45 States of Matter, 46–54, Engineer It!, From “Ink” to Objects: 3D Printing, 55 Changes of State, 56–64 Extraordinary Science-Freeze that Scalpel!, 65 Gas Behavior, 66– 75 Case Study-Rising to the Occasion: Charles Law in the Oven, 76–77 Topic 2 Review and Assess, 78–79, 80–81 uDemonstrate Lab: Melting Ice, 82–85
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Develop a model to predict and/or describe phenomena. (Developing and using models) (Personal: Initiative/Self-direction)	**SE/TE:** Model It!, 50 Model It!, 63 Model It!, 71 Topic 2 Review and Assess Q2&3, 81 uDemonstrate Lab-Melting Ice, 82–85
Analyze and interpret data to determine similarities and differences in findings. (Analyzing and interpreting data) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** Math Toolbox-Energy in Chemical Reactions, 31 uDemonstrate Lab – Help Out Wildlife 38-41 uDemonstrate Lab – Testing Thermal Conductivity, 170–173
Gather, read and synthesize information from multiple appropriate sources and assess the credibility, accuracy and possible bias of each publication and methods used, and describe how they are support or not supported by evidence (Obtaining, Evaluating, and Communication Information) (Professional: Information literacy)	**SE/TE:** Producing Useful Materials, 428–435 Connect It!,428 Academic Vocabulary, 429 Literacy Connection, 433 Lesson Check Q5, 435
Connection to Nature of Science: Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Case Study-An Epic Disaster, 22-23

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Elaboration on the GLE:	
Students can answer the question: How do particles combine to form the variety of matter one observes?	**SE/TE:** Describing and Classifying Matter, 4–12 Atoms and the Periodic Table, 330–331 Atomic Theory, 334–343 The Periodic Table, 346–358 Types of Bonds, 368–377 Acids and Bases, 378–384
PS1:A Structure and Properties of Matter: Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. Solids may be formed from molecules, or they may be extended structures with repeating sub-units (e.g., crystals). Each pure substance has characteristic physical and chemical properties that can be used to identify it. Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.	**SE/TE:** States of Matter, 46–54 Changes of State, 56–64 Atoms and the Periodic Table, 330–331 Atomic Theory, 334–343 The Periodic Table, 346–358 Types of Bonds, 368–377 Acids and Bases, 378–384 Physical and Chemical Properties Quest Check-In, 357 Evidence of Chemical Reactions, 412–413 Connect It!, 420 Model It!, 422 Chemical Reactions and Equations, 93 Topic 9 Review, 438–439, uDemonstrate Lab – Evidence of Chemical Change, 442–445
Scale, Proportion and Quantity: Time, space and energy phenomena can be observed at various scales using models to study systems that are too small or too large.	**SE/TE:** Atomic Theory, 334–343 The Periodic Table, 346–357 Types of Bounds, 368–377
Patterns: Macroscopic patterns are related to the nature of microscopic and atomic-level structure.	**SE/TE:** Measuring Matter, 14–21 Changes in Matter, 24–32 Mixtures and Solutions, 398–406 Chemical Chance, 408–418

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Structure and Function: Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.	**SE/TE:** Mixtures and Solutions, 428–435
Cause and Effect: Cause - and - effect relationships may be used to predict phenomena in natural or designed systems.	**SE/TE:** States of Matter 46–54 Changes of State, 56–64 Describing Motion 450–457 Speed, Velocity, and Acceleration, 458–467 Newton's Laws of Motion, 470–478 Friction and Gravitational Interactions, 480–488 Topic 10 Review – Evidence-Based Assessment, 492–493
Influence of Science, Engineering, and Technology on Society and the Natural World: The uses of technology and any limitation on their use are driven by individual and societal needs, desires and values; by the findings of scientific research; and by differences in such factors as climate, natural resources and economic conditions. Thus, technology use varies from region to region and over time.	**SE/TE:** uEngineer It!:, Gathering Speed with Superconductors, 33 uEngineer It!: When Particles Collide, 367

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Grade Level Expectation:	
2. Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy.	
Evidence Outcomes:	
Students Can:	
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2) (Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.) (Boundary statement: Limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability and odor.)	
Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (MS PS 1-5) (Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms that represent atoms.) (Boundary Statement: Does not include the use of atomic masses, balancing symbolic equations or intermolecular forces.)	**SE/TE:** Modeling Chemical Reactions, 420–427
Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. (MS PS1-6) (Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.) (Boundary Statement: Limited to the criteria of amount, time and temperature of substance in testing the device.)	**SE/TE:** Topic 4 Quest: Keep Hot Liquids Hot: 138–139, 154, 165, 169 Topic 4 Review and Assess, 166–167 uDemonstrate Lab: Testing Thermal Conductivity, 170–173 Topic 9 Quest: Hot and Cold Chemistry: 396–397, 406, 418, 427, 435, 441 Changes in Energy & Energy Graphs for Chemical Reactions, 414, 415
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Develop a model to describe unobservable mechanisms. (Developing and Using Models) (Entrepreneurial: Creativity/Innovation)	**SE/TE:** Model It! – Models of Atoms, 339 Lesson 1 Check Q-5, 343 Lesson 3 Check Q-2, 366 Model It! – How Ions Form, 370 Lesson 4 Check Q3, 377 uDemonstrate Lab, 390–393
Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (Constructing Explanation and Designing Solutions) (Entrepreneurial: Creativity/Innovation)	**SE/TE:** uDemonstrate Lab, 38–41 uEngineer It!, 55 uEngineer It!, 107 Quest Kickoff and Projects 396–397, 406, 418. 427, 435, 441

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Connections to Nature of Science: Laws are regularities or mathematical descriptions of natural phenomena.	**SE/TE:** Law of Conservation of Mass, 424 Math Toolbox, 425 Topic 9 Review and Assess – Evidence-Based Assessment, 440-441
Elaboration on the GLE:	
Students can answer the questions: How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?	**SE/TE:** Chemical Change in Matter, 27-29 Evidence of Chemical Reactions, 412–413 Modeling Chemical Reactions, 420-426 Model It!, 422 Hands-On Lab, 423 Quest Check-In, 427 uDemonstrate Lab, 442–445
PS1:B Chemical Reactions: Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. The total number of each type of atom is conserved, and thus the mass does not change. Some chemical reactions release energy, others store energy.	**SE/TE:** Quest Check-In, 357 Model It!, 410 Chemical Change, 410 Changes in Energy, 414-415 Model It!, 422 Law of Conservation of Mass, 424-426 Quest Check-In, 427
Cross Cutting Concepts:	
Energy and Matter: Matter is conserved because atoms are conserved in physical and chemical processes. The transfer of energy can be tracked as energy flows through a designed or natural system.	**SE/TE:** Evidence of Chemical Reactions 412-413 Changes in Energy, 414 Energy Graphs for Chemical Reactions, 415

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
2. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding interactions between objects and within systems of objects.	
Grade Level Expectation:	
3. Motion is described relative to a reference frame that must be shared with others and is determined by the sum of the forces acting on it. The greater the mass of the object, the greater the force needed to achieve the same change in motion.	
Evidence Outcomes:	
Students Can:	
Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. (MS-PS-2-1) (Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.) (Boundary Statement: Limited to vertical or horizontal interactions in one dimension.)	**SE/TE:** uEngineer It!, 479 uDemonstrate It Lab, 494–497 Quest Kickoff and Quest Check-ins, 448-449, 457, 467, 478, 488, 493
Plan an investigation to provide evidence that the change in an objects motion depends on the sum of the forces on the object and the mass of the object. (MS-PS-2-2) (Clarification Statement: Emphasis is on balanced [Newton's First Law] and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion [Newton's Second Law], frame of reference and specification of units.) (Boundary Statement: Limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.)	**SE/TE:** Describing Motion and Force, 450–457 Newton's Second Law of Motion, 472-474 164–167 uDemonstrate It Lab, 494–497
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Apply scientific ideas or principles to design an object, tool, process, or system. (Constructing Explanation and Designing Solutions) (Personal: Personal responsibility).	**SE/TE:** uEngineer It!, 479 uDemonstrate It Lab, 494–497
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded and how many data are needed to support a claim. (Planning and Carrying Out Investigations) (Personal: Initiative/Self-direction)	**SE/TE:** Describing Motion and Force, 450–457 Newton's Second Law of Motion, 472-474 494–497 uDemonstrate It Lab, 494–497

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Connections to Nature of Science: Science is knowledge based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Lesson 1 Check, 457 Q2 Lesson 2 Check, 467 Q3 & Q5 Lesson 4 Check, 488 Q5 Topic 10 Review and Assess, 492-493, Q1, Q4, Q5
Elaboration on the GLE:	
Students can answer the question: How can one predict an object's continued motion, changes in motion or stability?	**SE/TE:** Describing Motion and Force, 450–457 Speed, Velocity, and Acceleration, 458–467 Newton's Laws of Motion, 470–478, uDemonstrate Lab, 494–497
PS2:A Forces and Motion: For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared.	**SE/TE:** Topic 10 Quest: Build a Better Bumper Car, 448–449, 457, 467, 478, 488, 493 Newton's Third Law, 475–477 uDemonstrate Lab, 494–497
Cross Cutting Concepts:	
Systems and System Models: Models can be used to represent systems and their interactions - such as inputs, processes and outputs - and energy and matter flows within systems.	**SE/TE:** uEngineer It!, 479 uDemonstrate Lab, 494–497
Stability and Change: Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.	**SE/TE:** Describing Motion and Force, 450–457 Speed, Velocity, and Acceleration, 458–467 Newton's Laws of Motion, 470–478, Topic 10 Review – Evidence-Based Assessment, 492-493

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
Connections to Engineering, Technology and Applications of Science: The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources and economic conditions.	
Grade Level Expectation:	
4. Forces that act a distance (gravitational, electric, and magnetic) can be explained by force fields that extend through space and can be mapped by their effect on a test object.	
Evidence Outcomes:	
Students Can:	
Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (MS-PS2-3) (Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.) (Boundary Statement: Limited to questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.)	**SE/TE:** Essential Question, 237 Quest Kickoff, 238 Question It!, 243 Model It!, 261 Math Toolbox, 262 Question It!, 272 Case Study, 276-277
Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (MS-PS2-4) (Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.) (Boundary Statement: Does not include Newton's Law of Gravitation or Kepler's Laws.)	**SE/TE:** Factors that Affect Gravity, 484-485 Energy, Forces, and Motion, 496-497 Lesson 4 Check Q5, 498
Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. (MS-PS2-5) (Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically charged strips of tape, and electrically-charged pith balls. Examples of investigations could include firsthand experiences or simulations.) (Boundary Statement: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.)	**SE/TE:** Topic 6 Quest: Light as a Feather, 238-239, 248, 257, 264, 275 Topic 6 Review and Assess, Evidence-Based Assessment, 280-281 uDemonstrate Lab, 282-285

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and when appropriate, frame a hypothesis based on observations and scientific principles. (Asking Questions and Defining Problems) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** Essential Question, 237 Quest Kickoff, 238 Question It!, 243 Model It!, 261 Math Toolbox, 262 Question It!, 272 Case Study, 276-277
Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (Engage in Argument from Evidence) (Entrepreneurial: Critical thinking/Problem solving)	**SE/TE:** Factors that Affect Gravity, 484-485 Energy, Forces, and Motion, 486-487 Lesson 4 Check Q5, 488
Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation. (Planning and Carrying Out Investigations) (Personal: initiative/Self-direction)	**SE/TE:** Topic 6 Quest: Light as a Feather, 238-239, 248, 257, 264, 275 Topic 6 Review and Assess, Evidence-Based Assessment, 280-281 uDemonstrate Lab, 282-285
Connections to Nature of Science: Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Question It!, 243 Hands-On Lab, 252 Lesson 2 Check Q4, 257 Lesson 4 Check Q3, 275 Topic 6 Review and Assess Q5, 278 Topic 6 Review and Assess-Evidence-Based Assessment Q3, 281 uDemonstrate Lab, 282-285
Elaboration on the GLE:	
Students can answer the question: What underlying forces explain the variety of interactions observed?	**SE/TE:** Topic 6 Quest: Light as a Feather, 238-239, 248, 257, 264, 275 uEngineer it!: Electromagnets in Action, 265 uDemonstrate Lab, 282-285

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
PS2:B Types of Interactions: Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass — e.g., Earth and the sun. Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively).	**SE/TE:** Electromagnetic Principles, 259 Magnetic Fields and Currents, 260-261 Model It!, 261 Math Toolbox, 262 Solenoids and Electromagnets, 262-263 Factors that Affect Gravity, 484-485 Extraordinary Science, 489 Topic 10 Review and Assessment-Evidence-Based Assessment, 492-493
Cross Cutting Concepts:	
Cause and Effect: Cause - and - effect relationships may be used to predict phenomena in natural or designed systems.	**SE/TE:** Model It!, 261 Math Toolbox, 262 Solenoids and Electromagnets, 262-263 Lesson 3 Check Q2, 264
Systems and Systems Models: Models can be used to represent systems and their interactions-- such as inputs, processes and outputs -- and energy and matter flows within systems.	**SE/TE:** Quest Kickoff and Quest Check-In, 238-239, 248, 257, 264, 275 Model It!, 261 Topic 6 Review and Assess, Evidence-Based Assessment, 280-281 uDemonstrate Lab, 282-285

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
Prepared Graduates:	
3. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how energy is transferred and conserved.	
Grade Level Expectation:	
5. Kinetic energy can be distinguished from the various forms of potential energy.	
Evidence Outcomes:	
Students Can:	
Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and the speed of an object. (MS-PS3-1) (Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball.)	**SE/TE:** Math Toolbox, 102 Model It!, 487 **Digital Activities:** Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
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-PS-3-2) (Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster car at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.) (Boundary Statement: Limited to two objects and electric, magnetic, and gravitational interactions.)	**SE/TE:** Potential Energy Figure 4, 243 Balloon and Paper, Figure 9, 247 Visualizing Magnetic Fields, Figure 4, 253 Model It!, 469Lesson 2 Check Q5, 257 Model It!, 261 Lesson 3 Check, 264
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-3) (Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.) (Boundary Statement: Does not include calculating the total amount of thermal energy transferred.)	**SE/TE:** Quest Kickoff and Quest Check-In, 138–139, 154, 165, 169 Topic 4 Review and Assess, 166–167 uDemonstrate Lab – Testing Thermal Conductivity, 170–173 Topic 9 Quest: Hot and Cool Chemistry, 396–397, 406, 418, 427, 435, 441 Changes in Energy & Energy Graphs for Chemical Reactions, 414-415

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
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) (Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.) (Boundary Statement: Does not include calculating the total amount of thermal energy transferred.)	**SE/TE:** Topic 4 Quest: Keep Hot Liquids Hot, 138–139, 154, 165, 169 Topic 4 Review and Assess, 166–167 uDemonstrate Lab – Testing Thermal Conductivity, 170–173
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) (Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object.) (Boundary Statement: Does not include calculations of energy.)	**SE/TE:** Topic 3 Quest: Outrageous Energy Contraptions, 88-89, 99, 106, 116, 125, 131 Lesson 4 Check Q4&5, 125
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (Analyzing and Interpreting Data) (Entrepreneurial: Critical thinking/Problem solving)	**SE/TE:** Calculating Kinetic Energy, 102 Math Toolbox, 102 Math Toolbox, 456 Math Toolbox, 461
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (Planning and Carrying Out Investigations) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** uDemonstrate Lab, 170-173 uDemonstrate Lab, 390–393
Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system. (Constructing Explanations and Designing Solutions) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** Topic 3 Quest: Outrageous Energy Contraptions: 88-89, 99, 106-116, 125, 131

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (Engaging in Argument from Evidence) (Entrepreneurial: Critical thinking/Problem solving)	**SE/TE:** Cite Textual Evidence, 110 Question It!, 112 Lesson 3 Check Q5, 116 Reading Check – Write Arguments, 483 Topic 10 Review and Assess – Evidence-Based Assessment Q2-5, 492-493
Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence: Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Question It!, 112 Lesson 3 Check Q5 Math Toolbox, 123Lesson 4 Check Q4&5, 125 Literacy Connection, 256, Lesson 2 Check Q4, 257 Math Toolbox, 262 Math Toolbox, 456
Elaboration on the GLE:	
Students can answer the question: What is energy?	**SE/TE:** Energy, Motion and Work, 90-99 Kinetic Energy and Potential Energy, 100-107 Other Forms of Energy, 108-116
PS3:A Definitions of Energy: Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. A system of objects may also contain stored (potential) energy, depending on their relative positions. Temperature is a measure of the average kinetic energy of particles of matter. The relationships between the temperature and total energy of a system depends on the types, states, and amounts of matter present.	**SE/TE:** Energy, Motion, Force and Work, 90–99 Kinetic Energy and Potential Energy, 100–106 Thermal Energy, 111 Thermal Energy, Heat, and Temperature, 140-146 **Digital Activities:** Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
Cross Cutting Concepts:	
Scale, proportion and quantity: Proportional relationships (e.g., speed as the relation of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.	**SE/TE:** Math Toolbox, 95 Work Related to Energy, 96-98 Lesson 1 Check Q4, 99 Math Toolbox, 102 Calculating Kinetic Energy, 102 Gravitational Potential Energy, 104 Speed, Velocity, and Acceleration, 458-467 Math Toolbox, 461

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
Energy and Matter: Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.	
Grade Level Expectation:	
6. Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states and amounts of matter.	
Evidence Outcomes:	
Students Can:	
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS PS3-3) (Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.) (Boundary Statement: Does not include calculating the total amount of thermal energy transferred.)	**SE/TE:** Quest Kickoff and Quest Check-In, 138–139, 154, 165, 169 Topic 4 Review and Assess, 166–167 uDemonstrate Lab – Testing Thermal Conductivity, 170–173 Quest Kickoff and Quest Check-Ins 396–397, 406, 418, 427, 435, 441 Changes in Energy & Energy Graphs for Chemical Reactions, 414, 415
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) (Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.) (Boundary Statement: Does not include calculating the total amount of thermal energy transferred.)	**SE/TE:** Topic 4 Quest: Keep Hot Liquids Hot, 138–139, 154, 165, 169 uDemonstrate Lab, 170-173
Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5) (Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object.) (Boundary Statement: Does not include calculations of energy.)	**SE/TE:** The Essential Question, 87 Topic 3 Quest: Outrageous Energy Contraptions 88-89, 99, 106,116, 125, 131 Connect It!, 90 Kinetic Energy, 101-102 Energy Changes Form, 119-121 uDemonstrate Lab, 132-135

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. (Construct Explanations and Designing Solutions) (Civic/Interpersonal: Civic-Engagement)	**SE/TE:** uEngineer It! 479 uDemonstrate Lab, 494-497
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (Planning and Carrying Out Investigations) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** uDemonstrate Lab, 132-135 Hands-On Lab, 142 uDemonstrate Lab – Testing Thermal Conductivity, 170–173
Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (Engaging in Argument from Evidence) (Entrepreneurial: Inquiry/Analysis)	**SE/TE:** Reading Check, 108 Question It!, 112 Lesson 3 Check Q5, 116 Lesson 4 Check Q4&5, 125 uDemonstrate Lab, 170-173 Literacy Connection, 485 Lesson 4 Check Q5, 489 uDemonstrate Lab, 494-497
Connections to Nature of Science: Scientific knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Energy at the Cookout, 114-115 Reading Check, 145 Lesson 1 Check Q6 & 7, 146 Math Toolbox, 151 Question It!, 153 Lesson 2 Check Q6, 154 Topic 10 Review and Assess Q1&2, 492-493
Elaboration on the GLE:	
Students can answer the questions: What is meant by conservation of energy? How is energy transferred between objects or systems?	**SE/TE:** Energy Changes Form, 119-121 Energy Changes and the Law of Conservation, 122-124 Topic 3 Review Q's 10-18, 129 Energy Conservation, 152

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
PS3:B Conservation of Energy and Energy Transfer: When the motion energy of an object changes, there is inevitably some other change in energy at the same time. The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. Energy is spontaneously transferred out of hotter regions or objects and into colder ones.	**SE/TE:** Work Related to Energy and Power, 96-98 Topic 4 Quest: Keep Hot Liquids Hot, 138–139, 154, 165, 169 Thermal Energy and Amount of Matter, Figure 8, 145 Types of Heat Transfer. 149-151
Cross Cutting Concepts:	
Energy and Matter: The transfer of energy can be tracked as energy flows through a designed or natural system. Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion).	**SE/TE:** Energy Changes Form, 119-121 Math Toolbox, 123 Topic 3 Review Q's 15-18, 129 Topic 3 Review and Assess, 130-131

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
Scale, Proportion, and Quantity: Proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.	
Grade Level Expectation:	
7. When two objects interact, each one exerts a force on the other that can cause energy to be transferred to and from the object.	
Evidence Outcomes:	
Students Can:	
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) (Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster car at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.) (Boundary Statement: Limited to two objects and electric, magnetic, and gravitational interactions.)	**SE/TE:** Topic 3 Quest: Outrageous Energy Contraptions, 88-89, 99, 106, 116, 125, 131 Kinetic Energy, 101-102 Potential Energy, 103-105 Topic 3 Review and Assessment Q4, 128 Energy, Forces, and Motion, 486-487
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (Developing and Using Models) (Personal: Initiative/Self-direction)	
Elaboration on the GLE:	
Students can answer the question: How are forces related to energy?	**SE/TE:** Topic 3 Quest: Outrageous Energy Contraptions, 88-89, 99, 106, 116, 125, 131 Energy in Motion and Force, 91-92 Work Related to Energy and Power, 96-98 Math Toolbox, 102 Figure 4, Energy at the Cookout, 114-115 Electric Force, Fields, and Energy, 241-243 Energy in Circuits, 245 Magnetic Force and Energy, 251-252

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
PS3:C Relationship Between Energy and Forces: When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. For example, when energy is transferred to an Earth-object system as an object is raised, the gravitational field energy of the system increases. This energy is released as the object falls; the mechanism of this release is the gravitational force. Likewise, two magnetic and electrically charged objects interacting at a distance exert forces on each other that can transfer energy between the interacting objects.	**SE/TE:** Topic 3 Quest: Outrageous Energy Contraptions, 88-89, 99, 106, 116, 125, 131 Gravitational Potential Energy, 104 Elastic Potential Energy, 105 Electric Force, Fields, and Energy, 241-243 Static Electricity, 246-247 How Forces Affect Motion, 453-456 Newton's Laws of Motion, 470-477 Factors that Affect Gravity, 484-485 Energy, Forces and Motion, 486-487
Cross Cutting Concepts:	
Systems and System Models: Models can be used to represent systems and their interactions - such as inputs, processes, and outputs - and energy and matter flows within systems.	**SE/TE:** Model It!, 98 Lesson 1 Check Q4, 248 Model It!, 255 Lesson 2 Check Q5, 257 Model It!, 487

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Prepared Graduates:	
4. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how waves are used to transfer energy and information.	
Grade Level Expectation:	
8. A simple wave model has a repeating pattern with specific wavelength, frequency, and amplitude and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena which include light and sound.	
Evidence Outcomes:	
Students Can:	
Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in the wave. (MS PS4-1) (Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.) (Boundary Statement: Does not include electromagnetic waves and is limited to standard repeating waves.)	**SE/TE:** Properties of Waves, 182-183 Math Toolbox, 184
Develop and use a model to describe that waves are reflected, absorbed or transmitted through various materials. (MS-PS4-2) (Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.) (Boundary Statement: Limited to qualitative applications pertaining to light and mechanical waves.)	**SE/TE:** Hands-On Lab, 182 Lesson 1 Check Q3, 185 Reflection, Refraction, and Absorption, 189-191 Plan It!, 190
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Use mathematical representations to describe and/or support scientific conclusions and design solutions. (Use Mathematics and Computational Thinking) (Entrepreneurial: Critical thinking/Problem solving)	**SE/TE:** Properties of Waves, 182-183 Math Toolbox, 184 uDemonstrate Lab, 232-235
Connections to Nature of Science: Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** Case Study, 186-187 Connect It!, 188 Lesson 2 Check Q4, 196 Topic 5 Review and Assess Q5 & Q9, 228
Elaboration on the GLE:	
Students can answer the question: What are the characteristic properties and behaviors of waves?	**SE/TE:** Wave Properties, 178-185 Wave Interactions, 188-196

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
PS4:A Wave Properties: A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. A sound wave needs a medium through which it is transmitted. Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet.	**SE/TE:** Properties of Waves, 182-183 Wave Interference, 192-195 The Behavior of Sound, 199-201 Factors Affecting the Speed of Sound, 202
Cross Cutting Concepts:	
Patterns: Graphs and charts can be used to identify patterns in data.	**SE/TE:** Math Toolbox, 123 Case Study, 126-127 Types of Interference, Figure 4, 192-193 Standing Waves, Figure 6, 194 Model It!, 201 Model It!, 211
Grade Level Expectation:	
9. A wave model of light is useful to explain how light interacts with objects through a variety of properties.	
Evidence Outcomes:	
Students Can:	
Develop and use a model to describe that waves are reflected, absorbed or transmitted through various materials. (MS-PS4-2) (Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.) (Boundary Statement: Limited to qualitative applications pertaining to light and mechanical waves.)	**SE/TE:** Reflection, Refraction, and Absorption, 189-191 Plan It!, 190 Lesson 2 Check Q1-4, 186 Model It!, 201 Lesson 3 Check Q7, 207 Model It!, 211 Light and Color, Figure 2, 434 Convex Mirror Image, Figure 6, 223 Model It!, 224
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Develop and use a model to describe phenomena (Developing and Using Models) (Personal: Personal responsibility)	**SE/TE:** Reflection, Refraction, and Absorption, 189-191 Plan It!, 190 Lesson 2 Check Q1-4, 196 Model It!, 201 Lesson 3 Check Q7, 207 Model It!, 211 Light and Color, Figure 2, 220 Convex Mirror Image, Figure 6, 223 Model It!, 224

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Elaboration on the GLE:	
Students can answer the question: How can one explain the varied effects that involve light?	**SE/TE:** Model the Electromagnetic Wave Behavior, 210-211 Model It!, 425, Math Toolbox, 213 Visible Light, 214 Light, 218-226 Lesson 5 Check, 227 Topic 5 Review and Assess Q15-Q18, 229 Topic 5 Review and Assess – Evidence-Based Assessment, 230-231
PS4:B Electromagnetic Radiation: When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. Lenses and prisms are applications of this effect. A wave model of light is useful for explaining brightness, color and the frequency dependent bending of light at a surface between media (prisms). However, because light can travel through space, it cannot be a matter wave, like sound or water waves.	**SE/TE:** Models of Electromagnetic Wave Behavior, 210-211 Particle Model of Light, 211 Light, Color, and Objects, 219-221 Reflecting Light, 222-224 Lenses, 225-226
Cross Cutting Concepts:	
Structure and Function: Structures can be designed to serve particular functions by taking into account properties of different materials and how materials can be shaped and used.	**SE/TE:** uEngineer It!, 197 Loudness and Pitch, 203-205 Color Filters, 221 Lenses, 225-226 Lesson 4 Check Q4, 435

Colorado Academic Standards for Science Middle School Physical Science	Elevate Science Physical, ©2019
Grade Level Expectation:	
10. Designed technologies can transmit digital information as wave pulses.	
Evidence Outcomes:	
Students Can:	
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) (Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in Wi-Fi devices, and conversion of stored binary patterns to make sound or text on a computer screen.) (Boundary Statement: Does not include binary counting or the specific mechanism of any given device.)	**SE/TE:** Essential Question, 287 Topic 7 Quest: Testing, Testing, 1,2,3…, 288-289, 298, 309, 320, 325 Electronic Signals, 302 Analog and Digital Signals, 304-306 Transmitting Signals Advantages of Digital Signals, 318-319 Topic 7 Review and Assessment - Evidence-Based Assessment, 324-325 uDemonstrate Lab. 326-329
Academic Context and Connections	
Colorado Essential Skills and Science and Engineering Practices:	
Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (Obtaining, Evaluating, and Communicating Information) (Professional: Communication)	**SE/TE:** Write About It, 295 uEngineer It!, 299 Literacy Connection, 304 Interactivity, 305 Case Study, 310-311 Extraordinary Science, 321 Topic 7 Review and Assess Q's 7,8,15, 322-323 Topic 7 Review and Assess – Evidence-Based Assessment Q4, 324-325 uDemonstrate Lab, 326-329
Elaboration on the GLE:	
Students can answer the question: How are instruments that transmit and detect waves used to extend human senses?	**SE/TE:** Radiosurgery, Figure 8, 215 uEngineer It!, 265 uDemonstrate Lab, 282-285 Electromagnetic Signals, 303 Transmitting Signals 307-308 Communication Systems, 315-317 Advantages of Digital Signals, 318-319 Extraordinary Science, 321

Colorado Academic Standards for Science Middle School Physical Science	**Elevate Science Physical, ©2019**
PS4:C Information Technologies and Instrumentation: Appropriately designed technologies (e.g., radio, television, cell-phones, wired and wireless computer networks) make it possible to detect and interpret many types of signals that cannot be sensed directly. Designers of such devices must understand both the signal and its interactions with matter. Many modern communication devices use digitized signals (sent as wave pulses) as a more reliable way to encode and transmit information.	**SE/TE:** Radiosurgery, Figure 8, 215 uEngineer It!, 265 uDemonstrate Lab, 282-285 Electromagnetic Signals, 303 Transmitting Signals 307-308 Communication Systems, 315-317 Advantages of Digital Signals, 318-319 Extraordinary Science, 321
Cross Cutting Concepts:	
Structure and Function: Structures can be designed to serve particular functions.	**SE/TE:** Physical Science uEngineer It!, 299 Hands-On Lab, 306 Roger That!, Figure 3, 316-317 Bandwidth, 319
Connections to Engineering, Technology, and Applications of Science: Technologies extend the measurement, exploration, modeling and computational capacity of scientific investigations.	**SE/TE:** Radiosurgery, Figure 8, 215 uEngineer It!, 265 uDemonstrate Lab, 282-285 Electromagnetic Signals, 303 Transmitting Signals 307-308 Communication Systems, 315-317 Advantages of Digital Signals, 318-319 Extraordinary Science, 321
Connections to Nature of Science: Advances in technology influence the progress of science and science has influenced advances in technology.	**SE/TE:** Radiosurgery, Figure 8, 215 uEngineer It!, 265 uDemonstrate Lab, 282-285 Electromagnetic Signals, 303 Transmitting Signals 307-308 Communication Systems, 315-317 Advantages of Digital Signals, 318-319 Extraordinary Science, 321