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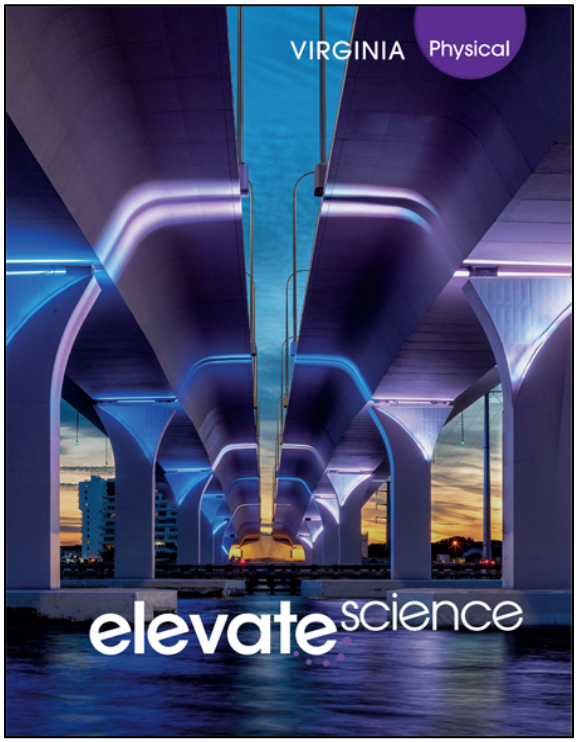

To the

Loudoun County Public Schools Physical Science Rubric

Prepared by Savvas Learning Company, formerly Pearson K12 Learning

Science Textbook Correlation to LCPS Science Office Criteria and
2018 Physical Science Standards of Learning and Curriculum Framework

Physical Science Rubric

Publisher: Savvas Learning Company, LLC	**Text: Virginia Elevate Science: Physical**	**Copyright date: 2021**
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Physical Science standards stress an in-depth understanding of the nature and structure of matter and the characteristics of energy. Major areas covered by the standards include the particle nature of matter, the organization and use of the periodic table; physical and chemical changes; energy transfer and transformations; properties of longitudinal and transverse waves; electricity and magnetism; and work, force, and motion. The standards continue to build on skills of systematic investigation with a clear focus on variables and repeated trials. Validating conclusions using evidence and data becomes increasingly important at this level. Technologies and scientific tools, including graphing calculators, computers, and probeware are used when appropriate and feasible. Mathematics, computational thinking, and experiences in the engineering design process gain importance as students advance in their scientific thinking.

Resources Meet the LCPS Science Philosophy and Practice	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources should develop students' ability to know, use, and interpret scientific explanations of the natural world; including developing and using models.	*Virginia Elevate Science: Physical* requires students to engage in scientific inquiry as they engage, think, investigate, and interact with natural phenomena through the variety of investigations designed to integrate elements of three-dimensional learning, such as developing and using models, interpreting and analyzing data, research activities, problem-based exercises and more. Organized by thematic topics, students 'experience' science through a variety of scaffolded hands-on, inquiry activities (uConnect, uInvestigate, uDemonstrate) designed to build their understanding of science concepts as they create explanations to explain phenomena about their natural world. **For examples, please see:** **ATE:** uConnect Lab: The Nuts and Bolts of Formulas, 4-5 uDemonstrate Lab: Melting Ice, 88-91 Model It!, 276

Instructional resources should develop students' ability to generate and evaluate scientific evidence and explanations; including developing and using models.	*Virginia Elevate Science: Physical* is designed to facilitate the development of the students' ability to generate and evaluate scientific evidence and explanations through activities that integrate elements of three-dimensional learning, such as analyzing and interpreting data, constructing explanations, designing solutions, developing and using models, and more. The Quest problem-based learning scenario provides a context for student learning and affords them the opportunity to develop models, generate data, and gather evidence to support their explanations of scientific phenomena. **For examples, please see the following:** **ATE:** Accidental Synthetics, 197 Case Study: The X-57 Maxwell, 466-467 uConnect Lab: Continuous or Discrete?, 480-481
Instructional resources should develop students' ability to understand the nature and development of scientific knowledge; When appropriate, instructional resources present multiple scientific perspectives and interpretations of scientific ideas as a representation of how science develops understanding of the natural world.	A variety of student-centered activities are incorporated in each topic that provide students with multiple perspectives on a theme. Science is presented as a 'quest' to discover knowledge and uncover new ideas, and not presented as a collection of facts to memorize. Students are encouraged to be active participants in their learning as they find solutions to real-world problems and participate in their learning 'adventure'. The *Virginia Elevate Science* program empowers students to ask questions, consider alternative ideas, evaluate evidence and engage in discourse to argue from evidence.

Instructional resources should develop students' ability to participate productively in scientific practices and discourse.	*Virginia Elevate Science: Physical* puts students on a path toward success in science learning and connects performance expectations within and across grades, creating a balanced and coherent sequence designed to deepen student understanding and develop their ability to participate productively in scientific practices and discourse. The investigations, including the Quest Finding (their solution ideas to the topic's Quest challenge) requires students to engage in the practice of 'arguing from evidence' as they present and defend their solution ideas or explain their data. Teacher Edition prompts help guide the classroom discourse and facilitate student conversations. **For examples, please see the following:** **ATE:** Focus on Mastery!, 90 Develop Classroom Collaboration, 338 Spark a Discussion, 513
Instructional resources reflect current best practices in the field of science instruction (pedagogy).	Students and teachers will benefit from Savvas' (formerly Pearson) experience in developing instructional materials informed by a strong research base. Savvas is the only major publisher that consistently invests in outside validation studies that meet the rigorous criteria of the What Works Clearinghouse. A research team, including educational research methodologists, has been working with Savvas to integrate scientific research practices into the development of our curricula. In *Virginia* E*levate Science*, that research is represented in the following features: ▪ Topics introduced with a phenomenon to engage students in the learning and encourages discourse and discovery. ▪ Topic organization which is built around problem-based learning scenarios called Quests. These PBLs provide context for student learning and actively engages the learner in finding solutions to the presented real-world topic challenge. To support engagement and address multiple learning modalities, the digital platform hosts a variety of interactive multimedia resources (video, simulations, interactivities, virtual labs) that further student understanding of the core science concepts. These resources reflect the best practices in teaching science to adolescents, utilizing a blend of print and digital media for student learning.

Materials consistently provide development and application of concepts and scientific practices through the exploration and use of appropriate technologies.	Flexible classroom management tools within the digital platform provide freedom and control to use a digital, print, or blended format. The inquiry activities in *Virginia Elevate Science* are designed to engage students in hands-on science—making observations, planning investigations, designing solutions and analyzing evidence. Students work like scientists and engineers to understand authentic, real-world phenomena through a variety of lab experiences designed for to meet the specific learning objectives of the SOLs. The digital platform provides powerful data gathering interactive experiences to engage students in the exploration of the science concepts. These resources can be used for personalizing learning through data-driven instruction. The assessment resources include technology-enhanced items that allow students to develop and apply concepts and scientific practices and experience next generation assessment formats.
Resource provides opportunities to engage in a meaningful scientific investigation of a watershed (stream or bay) as defined by the Virginia Department of Education (MWEE)	*Virginia Elevate Science: Physical* provides opportunities for students to engage in the types of investigative essential experiences as described by the Chesapeake MWEE. The student investigations promote active, student-focused questioning, the collection and analysis of self-generated data, and gets them involved in going out-of-doors to explore the natural environment. In several topics in each grade, the Quest real-world problem reflects an environmental theme and encourages students to be active in the promotion of community-based solutions. These student experiences can be found in the topics where the concepts of ecosystems, habitat diversity and human impact on the environment are explored. *Virginia Elevate Science: Physical,* focuses on physical science and its applications. For examples that meet this criteria, please refer to *Virginia Elevate Science: Grade 6,* and *Virginia Elevate Science: Life*.

Resource provides opportunities for students to engage in computational thinking by solving problems that logically organize and classify data and use a series of steps (algorithms).	*Virginia Elevate Science: Physical* puts students on a path toward success in science learning by making science relevant and meaningful for today's students and teaching them to work similarly to that of actual scientists and engineers. Scientific inquiry, investigating phenomena, computational thinking, problem-solving and analysis and application of core concepts are emphasized as a goal for all students. In many of the investigations and intext response prompts, students are gathering and generating data, engaging in grade appropriate computational thinking exercises, and applying mathematical algorithms as a way to interpret and analyze the data they have generated. The *Virginia Elevate Science* program also includes correlations to grade level mathematics standards. **For examples, please see:** **ATE:** Math Toolbox: Nutrient Concentration, 196 Case Study: Is Plastic Really So Fantastic?, 202-203 Math Toolbox: Home Run and Air Density, 253
Resources provide opportunities for students to use technology to learn science content and science process skills.	Virtual labs, interactive simulations and videos, along with an interactive student e-text all provide opportunities for students to use technology to learn and practice science concepts and skills. Our innovative technology-enhanced items, performance-based assessments, and adaptive learning programs help measure and build key 21st-century skills in learners of all abilities—including the elements of conceptual understanding, basic and procedural skills, and problem solving. **For examples, please see:** **ATE:** Accidental Synthetics, 197 Literacy Connection, 275, 446

Resources provide opportunities for students to explore advances in technology and scientific discovery that have occurred since your last publication date.	The intuitive digital path is more than an ancillary to the program; it is a vital component of our approach to learning that places the student at the center of the process of discovery. The digital path enables students to explore science in a way that emphasizes their own quest for knowledge and creativity. By organizing the material in topics, students can explore advances in technology and scientific discovery that develop beyond publication of printed materials. The uEngineer It! investigations and STEM activities encourage students to research and make use of current advances in science and apply those to their Quest solutions. The **Engineering Design Notebook** promotes research into current technologies as students design and devise their own innovation solutions to the engineering challenge of the topic.

Resources Support the LCPS Mission, Core Beliefs and Strategic Goals **https://bit.ly/2VV3lDB**	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources support the potential for integration into Project-Based Learning (PBL).	**Phenomena-Based Quests:** Each topic engages students with a phenomena-based learning scenario called a 'Quest'. The Quest contains a real-world problem for them to solve as they explore the science concept and develop the necessary science inquiry skills. A topic opening phenomenon and Essential Question open the topic and puts students on that path toward experiencing the topic content and skills. Students investigate the phenomena and use their experiences, the e-text photos, diagrams, and other visual elements to apply them to the concepts they are learning. The scaffolded labs throughout the topic introduce core ideas in context as students 'experience' science while they gain new knowledge in the hands-on setting. **For examples, please see the following:** **ATE:** The Essential Question, 307 Quest Kickoff, 308-309 Types of Interference, 326
Instructional resources provide opportunities for Personalized Learning and the exercise of student voice and choice.	Teachers can individualize the instruction by assigning different resources to either individual students or group of students. Many of the uInvestigate activities give students the opportunity to develop their own plans to conduct the investigation. The *Virginia Elevate Science: Physical* Teacher Edition offers comprehensive differentiation instruction and intervention support to address the needs of all learners—whether they are struggling, on-level, or advanced learners. This support provides system-driven opportunities to personalize learning for students and a library of resources to support the teacher in personalizing instruction and allowing students to exercise their voice and choice.

Instructional resources include grade level performance assessments that are formative and summative.	Learning outcomes are at the heart of each assessment we create, including those in our science worktexts. There are two types of performance assessments at the end of each topic- the Evidence-based assessment and the uDemonstrate investigation lab. Both of these assessments require students to demonstrate their understating of topic concepts through its application in a new setting. Our innovative technology-enhanced items, performance-based formative and summative assessments, and adaptive learning programs help measure and build key 21st-century skills in learners of all abilities—including the elements of conceptual understanding, basic and procedural skills, and problem solving. In print assessments includes lesson checks, investigation checks, and0 end-of-topic assessments.
Instructional resources support individual, small group, and whole class learning opportunities and collaboration.	*Virginia Elevate Science: Physical* provides opportunities for students to work individually, in small, cooperative groups and engage in science and engineering practices as a whole class. Teacher Edition provides suggested grouping guidelines for the different hands-on activities, and other student interactions. The digital platform allows for group collaboration and the sharing of ideas through the Google integration tools. Teachers are able to group and assign students into learning cohorts based on ability, need and class preferences.
Instructional resources consistently include content promoting use of critical thinking skills and problem-solving approaches and provide opportunities for students to use critical thinking skills and problem solving through a process of sustained inquiry.	*Virginia **Elevate Science*** includes a variety of opportunities for students to practice and demonstrate critical-thinking and problem-solving skills. The uEngineer It activities highlight open-ended problem solving. The digital interactives encourage critical-thinking and analysis. The performance-based tasks, research projects, inquiry investigations, labs, open-ended response questions, multiple choice questions, drag-and-drop questions, and other content that provides opportunities for students to use critical thinking and problem solving through a process of sustained inquiry.

Materials consistently promote the introduction of concepts through concrete experiences.	*Virginia Elevate Science* is designed for students to 'experience' science and not just read about it. Every lesson begins with the hands-on activity called uInvestigate, giving them concrete experiences to engage their minds and make science real. Up-to-date, accurate, themed topics are used to build knowledge in each unit, emphasizing the common characteristics of a unifying, relevant concept and promoting in-depth understanding through daily lessons. The Quest challenge uses real-world challenges to set a context for student learning. **For examples, please see the following:** **ATE:** Case Study: Finding Your Way With GPS, 394-395 Types of Friction, 408-409 Quest Findings, 419
Instructional resources provide opportunities for students to apply learning in real-world situations.	Every lesson begins with the hands-on activity called uInvestigate, giving them concrete experiences to engage their minds and make science real. Up-to-date, accurate, themed topics are used to build knowledge in each unit, emphasizing the common characteristics of a unifying, relevant concept and promoting in-depth understanding through daily lessons. The Quest challenge uses real-world challenges to set a context for student learning. Visual analogies connect difficult concepts to real world issues to help students better understand the concepts presented. **For examples, please see the following:** **ATE:** Connect to the Real World: Climate Change, 32 Connect to the Real World: Different Clothing Needs, 268 Connect to the Real World: Noise in the Workplace, 334

Materials consistently provide the appropriate level of abstraction and appropriate practical/real-life examples.	A rigorous curriculum offers students equal opportunities to develop understanding, practice key concepts and skills, and apply these concepts and skills in real-world or abstract situations. *Virginia Elevate Science* includes engaging real-life visuals, a write-in student text with practical examples and a consistent organization that aids student learning.
Materials consistently provide sufficient, grade-level appropriate examples of applications of concepts to promote depth of understanding.	Materials present current, scientifically accurate, and grade-appropriate scientific information, phenomena, and representations. Outside fact-checkers verify data used and authenticity of identified facts. A full research bibliography is available showing the research reviewed and sources cited that informed development of the program.

Resources are Inclusive, Accessible, Culturally Responsive, and Free of Bias	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources represent women, people of different ages, religious, ethnic and racial minorities and persons with disabilities in many different environments and occupations, and in the roles of current science career fields.	Savvas systematically develops its educational products and vets its partnership products by implementing criteria and standards that reflect multiethnic, multiracial, and multicultural perspectives. Over the years, we have worked with numerous experts and consultants from universities and other educational institutions to provide a broad perspective in our educational materials. While creating high-quality educational content, our standards are aimed at the following: ▪ Integrating multicultural experiences into program content so students see themselves as part of what is valued in the school's curriculum ▪ Fostering self-esteem for greater academic achievement ▪ Empowering students to act effectively in a democratic society and reach their full potential ▪ Reducing prejudice by showing multicultural friendships and people from different backgrounds, working, playing, and living together Our educational materials consider the needs of all students and are designed to provide a fair, balanced representation of various cultural groups and members, including racial, ethnic and religious groups; males and females; older people; and people with disabilities.
Instructional resources are free from stereotypes which assign a rigid set of characteristics to all members of a group.	Educational materials consider the needs of all students, are free from stereotypes, and are designed to provide a fair, balanced representation of various cultural groups and members, including racial, ethnic and religious groups; males and females; older people; and people with disabilities.

Instructional resources provide teachers with strategies for meeting the needs of Advanced Learners, English Learners and Special Education students.	Instructional materials provide LCPS teachers with research-based social and emotional learning curriculum and materials for all learners, including students who receive special education services and students who receive gifted and talented services. Instructional materials also provide differentiating instruction based on diverse learners (i.e., sections provide scaffolds for ELLs and students with disabilities, teacher guidance in the introductory section, etc.) and scaffolded tools for remediation (for example, appendix resources for writing and editing, teacher guidance for assigning reading, etc.). The Savvas Realize platform include multiple resources that teachers can assign to support individual student learning goals.
Instructional resources include accessibility features and tools for Advanced Learners, English Learners and Special Education students.	Instructional materials provide LCPS students with compliant, accessible resources. Our digital development team ensures that the online resources have embedded tools and features designed to make sure all students can access the activities, text and assessments. **For examples, please see the following:** **ATE:** ELD Support, 7 Differentiated Instruction, 507
Instructional resources include Tier 2 and Tier 3 vocabulary necessary to support English Learners and Special Education students.	LCPS can be confident in high-quality instructional materials and services that are developed for quality, efficacy, and usability, and are based on critical foundational research and proven classroom results. *Virginia Elevate Science: Physical* was developed to meet the needs of a diverse, high-need student population, including economically disadvantaged students, underrepresented racial/ethnic groups, and large populations of ELLs. **For examples, please see the following:** **ATE:** ELD Support, 431 Differentiated Instruction, 507

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2018 Physical Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
PS.2 The student will investigate and understand that matter is composed of atoms. Key ideas include	
a) our understanding of atoms has developed over time;	**ATE:** **Topic 3: Atoms and the Periodic Table** Development of Atomic Theory, pp. 99-103 Literacy Connection: Determine Central Ideas, p. 100 Model It!, p. 103 A Modern Model of the Atom, pp. 104-106 Lesson 1 Check: #1, #2, p. 107 Mendeleev's Work, p. 112 Topic 3 SOL Review: #3, #4, p. 150
b) the periodic table can be used to predict the chemical and physical properties of matter; and	**ATE:** **Topic 3: Atoms and the Periodic Table** The Periodic Table, p. 112 Using the Periodic Table, pp. 113-115 Groups in the Periodic Table, pp. 118-120 Elements and the Periodic Table, p. 123 Valence Electrons and the Table, p. 125 Bonding and Periodic Properties, pp. 126-129 Topic 3 SOL Review, #6, #8, #10, p. 150 Evidence-Based Assessment, pp. 152-153

c) the kinetic molecular theory is used to predict and explain matter interactions.	**ATE:** **Topic 2: Solids, Liquids, and Gases** Quest Kickoff, pp. 46-47, 60 Explaining States of Matter, pp. 58-59 uEngineer It!: From "Ink" to Objects: 3D Printing, p. 61 Thermal Energy and Temperature, p. 63 Case Study: Rising to the Occasion: Charles's Law in the Oven!, pp. 82-83 uDemonstrate Lab: Melting Iced, pp. 88-91 **Topic 6: Thermal Energy** Temperature, Energy, and Friction, pp. 294-295 Evidence-Based Assessment, pp. 300-301

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PS.3 The student will investigate and understand that matter has properties and is conserved in chemical and physical processes. Key ideas include	
a) pure substances can be identified based on their chemical and physical properties;	**ATE:** **Topic 1: Introduction to Matter** Quest Kickoff, pp. 2-3 Matter, pp. 7-9 **Topic 2: Solids, Liquids, and Gases** uConnect Lab: Solid, Liquid, or Gas, pp. 48-49 Solids, Liquids, and Gases, pp. 51-57 uEngineer: From "Ink" to Objects: 3D Printing, p. 61 **Topic 4: Chemical Reactions** Quest Kickoff, pp. 160-161 Properties of Pure Substances, p. 197 uDemonstrate Lab: Evidence of Chemical Change, pp. 208-211

b) pure substances can undergo physical and chemical changes that may result in a change of properties;	**ATE:** **Topic 1: Introduction to Matter** Physical Changes in Matter, pp. 27-28 Chemical Changes in Matter, pp. 29-30 Math Toolbox, p. 31 **Topic 4: Chemical Reactions** Changing Matter, pp. 175-176 Evidence of Chemical Reactions, pp. 178-179 Affecting Rates of Reaction, pp. 182-183 It's All Connected: The Art of Chemical Change, p. 185 uDemonstrate Lab: Evidence of Chemical Change, pp. 208-211
c) compounds form through ionic and covalent bonding; and	**ATE:** **Topic 3: Atoms and the Periodic Table** Bonding, pp. 124-125 Model It!, p. 134 Ionic Bonding, pp. 134-135 Covalent Bonding, pp. 136-138 Properties of Compounds, pp. 139-140 Lesson 4 Check: #2, #3, p. 141 Topic 3 SOL Review, #16, p. 151
d) balanced chemical equations model the conservation of matter.	**ATE:** **Topic 4: Chemical Reactions** Chemical Equations, pp. 187-189 Model It!, p. 188 Law of Conservation of Mass, pp. 190-191 Math Toolbox, p. 191 Lesson 3 Check: Infer, p. 193 Topic 4 SOL Review, #13, p. 205 Topic 4 Evidence-Based Assessment, pp. 206-207

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PS.4 The student will investigate and understand that the periodic table is a model used to organize elements based on their atomic structure. Key uses include	
a) symbols, atomic numbers, atomic mass, chemical groups (families), and periods are identified on the periodic table; and	**ATE:** **Topic 3: Atoms and the Periodic Table** The Periodic Table, p. 112 Using the Periodic Table, pp. 113-115 Math Toolbox, p. 115 Periods in the Periodic Table, pp. 116-117 Groups in the Periodic Table, pp. 118-120 Lesson 2 Check: #3, #4, p. 121 Topic 3 Evidence-Based Assessment, pp. 152-153
b) elements are classified as metals, metalloids, and nonmetals.	**ATE:** **Topic 3: Atoms and the Periodic Table** Periods in the Periodic Table, pp. 116-117 Groups in the Periodic Table, pp. 118-120 Bonding and Periodic Properties, pp. 126-129 Lesson 3 Check: Construct Explanations, p. 130 Topic 3 SOL Review, #14, #15, p. 151

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PS.5 The student will investigate and understand that energy is conserved. Key ideas include	
a) energy can be stored in different ways;	**ATE:** **Topic 5: Energy** Potential Energy, pp. 231-233 Figure 2: Stored Up Energy, p. 231 Lesson 2 Check, #5, p. 234 uEngineer It!, Prosthetics on the Move, p. 235 Nuclear Energy, p. 238 Chemical Energy, p. 240 Question It!, p. 240 Topic 5 SOL Review: #6, #7, p. 258

b) energy is transferred and transformed; and	**ATE:** **Topic 5: Energy** Energy Changes Form, pp. 247-251 Evidence-Based Assessment, p. 260 uDemonstrate Lab: 3, 2, 1,…Liftoff!, pp. 262-265 **Topic 8: Forces and Motion** Quest Kickoff, pp. 372-373 uEngineer It!: Generating Energy from Potholes, p. 405 Energy, Forces, and Motion, pp. 412-413 **Topic 9: Electricity and Magnetism** Quest Kickoff, pp. 426-427 Static Electricity, pp. 436-437
c) energy can be transformed to meet societal needs.	**ATE:** **Topic 3: Atoms and the Periodic Table** Case Study: Unlocking the Power of the Atom, pp. 108-109 **Topic 5: Energy** Careers: Energy Engineer, p. 245 Energy Transformations and Society, pp. 250-251 Reading Check: Reflect, p. 250 Lesson 4 Check: Connect to Society, p. 255 Case Study: U.S. Energy Consumption, pp. 256-257 **Topic 10: Information Technologies** Extraordinary Science, p. 513

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PS.6 The student will investigate and understand that waves are important in the movement of energy. Key ideas include	
a) energy may be transferred in the form of longitudinal and transverse waves;	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** uConnect Lab, pp. 310-311 Transverse Waves, p. 314 Figure 2: Transverse Waves, p. 314 Longitudinal Waves, pp. 315-316 Literacy Connection: Integrate Information, p. 315 Reading Check: Compare and Contrast, p. 315 Lesson 1 Check: #1, #3, p. 319
b) mechanical waves need a medium to transfer energy;	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** Types of Waters, pp. 313-315 Predict, p. 317 Case Study: Sound and Light at the Ball Park, pp. 320-321 The Behavior of Sound, pp. 333-335 Factors Affecting the Speed of Sound, p. 336 uDemonstrate Lab: Making Waves, pp. 366-369

c) waves can interact; and	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** Reflection, Refraction, and Absorption, pp. 323-325 Plan It!, p. 324 Literacy Connection: Integrate Information, p. 325 Wave Interference, pp. 326-329 Make Meaning, p. 329 Lesson 2 Check: Interpret Data, p. 330 Topic 5 SOL Review, #6-#9, p. 362 uDemonstrate Lab: Making Waves, pp. 366-369
d) energy associated with waves has many applications.	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** Quest Kickoff, pp. 308-309 uEngineer It!: Say "Cheese!", p. 331 Figure 5: Using an Equalizer, p. 338 Connect It!, p. 342 The Electromagnetic Spectrum, pp. 347-349 Lesson 4 Check: Connect to Society, p. 350 Case Study: Sound and Light at the Ball Park, pp. 320-321 uDemonstrate: Making Waves, pp. 366-369

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PS.7 The student will investigate and understand that electromagnetic radiation has characteristics. Key ideas include	
a) electromagnetic radiation, including visible light, has wave characteristics and behavior; and	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** Quest Kickoff, pp. 308-309, Characteristics of Electromagnetic Waves, p. 343 Models of Electromagnetic Wave Behavior, pp. 344-345 Model It!, p. 345 Wavelength and Frequency, p. 346 The Electromagnetic Spectrum, pp. 347-349 Topic 7 SOL Review: Develop Models, p. 363 Evidence-Based Assessment, pp. 364-365
b) regions of the electromagnetic spectrum have specific characteristics and uses.	**ATE:** **Topic 7: Waves and Electromagnetic Radiation** The Electromagnetic Spectrum, pp. 347-349 Figure 4: Mobile Phones, p. 347 Figure 5: Lighting Up the Radar Gun, p. 348 Figure 8: Radiosurgery, p. 349 Reading Check: Draw Conclusions, p. 349 Lesson 4 Check: Connect to Society, p. 350 Quest Check-In, p. 350

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PS.8 The student will investigate and understand that work, force, and motion are related. Key ideas include	
a) motion can be described using position and time; and	**ATE:** **Topic 8: Forces and Motion** Quest Kickoff, pp. 372-373 uConnect Lab: Identifying Motion, pp. 374-375 An Object in Motion, pp. 377-378 Calculating Speed, pp. 385-387 Math Toolbox, p. 387 Describing Velocity, p. 388 Determining Acceleration, pp. 389-392 Case Study: Finding Your Way With GPS, pp. 394-395
b) motion is described by Newton's laws.	**ATE:** **Topic 8: Forces and Motion** Newton's First Law of Motion, pp. 397-398 Newton's Second Law of Motion, pp. 399-400 Math Toolbox, p. 400 Newton's Third Law of Motion, pp. 401-403 Reflect, p. 403 Quest Check-In, p. 404 Universal Gravitation, p. 410 uDemonstrate Lab: Stopping on a Dime, pp. 420-423

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PS.9 The student will investigate and understand that there are basic principles of electricity and magnetism. Key ideas include	
a) an imbalance of charge generates static electricity;	**ATE:** **Topic 9: Electricity and Magnetism** Quest Kickoff, pp. 426-427 Static Electricity, pp. 436-437 Reflect, p. 437 Reading Check: Describe, p. 437 Differentiated Instruction, p. 437 Lesson 1 Check: Develop Models, p. 438 Quest Check-In, p. 438

b) materials have different conductive properties;	**ATE:** **Topic 3: Atoms and the Periodic Table** Physical Properties of Metals, p. 127 Electrical Conductivity, p. 139 uDemonstrate Lab, pp. 154-157 **Topic 9: Electricity and Magnetism** Quest Kickoff, pp. 426-427 Current and Resistance, p. 435 Figure 6: Conductors and Insulators of Charge, p. 435 Reading Check: Explain, p. 435 Differentiated Instruction, p. 435
c) electric circuits transfer energy;	**ATE:** **Topic 9: Electricity and Magnetism** Electrical Current and Circuits, pp. 434-435 **Topic 10: Information Technologies** Quest Kickoff, pp. 478-479 Connect It!, p. 482 Parts of a Circuit, pp. 483-485 Model It!, p. 485 Series and Parallel Circuits, pp. 487-489 Lesson 1 Check: #1, #3, p. 490 Electronic Signals, p. 494
d) magnetic fields cause the magnetic effects of certain materials;	**ATE:** **Topic 9: Electricity and Magnetism** Quest Kickoff, pp. 426-427 uConnect Lab, pp. 428-429 Magnetic Force and Energy, pp. 441-442 Magnetic Fields, pp. 443-446 Lesson 2 Check: #4, #5, p. 447 Quest Check-In, p. 447 Topic 9 Evidence-Based Assessment, pp. 470-471 uDemonstrate Lab, pp. 472-475

e) electric current and magnetic fields are related; and	**ATE:** **Topic 9: Electricity and Magnetism** Quest Kickoff, pp. 426-427 Electromagnetic Principles, p. 449 Magnetic Fields and Current, pp. 450-451 Math Toolbox, p. 452 Quest Check-In, p. 454 uEngineer It!: Electromagnetism in Action, p. 455 Electromagnetic Induction, pp. 460-462 Topic 9 Evidence-Based Assessment, pp. 470-471
f) many technologies use electricity and magnetism.	**ATE:** **Topic 9: Electricity and Magnetism** Figure 1: Magnetic Strength, p. 449 Figure 6: Electromagnets, p. 453 Lesson 3 Check: Engage in Argument, p. 454 uEngineer It!: Electromagnetism in Action, p. 455 Generators and Transformers, pp. 463-464 Case Study: The X-57 Maxwell, p. 466 **Topic 10: Information Technologies** Quest Kickoff, pp. 478-479 Case Study: Super Ultra High Definition!, pp. 502-503