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A Correlation of

Elevate Science
Physical, ©2019

To the

Next Generation Science Standards
Middle School Physical Science
DCI Arrangement

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To the
Next Generation Science Standards for Middle School Physical Science

Introduction

This document demonstrates how ***Elevate Science ©2019*** meets the Next Generation Science Standards for Middle School. Correlation page references are to the Student and Teacher's Editions and cited at the page level.

Pearson is proud to introduce ***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.
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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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Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
MS-PS1 Matter and Its Interactions	
Performance Expectation MS-PS1-1.	
Develop models to describe the atomic composition of simple molecules and extended structures.	**SE/TE:** 3A–3B, 4, 12, 34, 35, 36, 37, 339, 340, 343, 366, 370–374, 386
Disciplinary Core Ideas	
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 subunits (e.g., crystals).	**SE/TE:** 4, 12, 48, 50, 341–343, 346, 358, 362–366, 368–377, 378, 384, 386–389
Science and Engineering Practices	
Developing and Using Models Develop and/or use a model to predict and/or describe phenomena.	**SE/TE:** 4, 12, 48, 50, 341–343, 346, 358, 362–366, 368–377, 378, 384, 386–389
Crosscutting Concepts	
Scale, Proportion, and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.	**SE/TE:** 8–10, 36–37, 123, 334–343, 346–357, 368–377
Performance Expectation MS-PS1-2.	
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**SE/TE:** 2–3, 13, 14–21, 22–23, 24–32, 33, 34–35, 332, 333, 368, 397A–397B, 398–406, 408–418, 422
Disciplinary Core Ideas	
PS1.A: Structure and Properties of Matter Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. **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.	**SE/TE:** 2–3, 5–7, 14–21, 24–32, 34–35, 357, 398–406, 411–418, 429–432

Next Generation Science Standards Middle School Physical Science	**Elevate Science Physical, ©2019**
Science and Engineering Practices	
Analyzing and Interpreting Data Analyze and interpret data to determine similarities and differences in findings. **Connections to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 17–21, 27, 29, 31, 398–406, 408–418
Crosscutting Concepts	
Patterns Macroscopic patterns are related to the nature of microscopic and atomic-level structure.	**SE/TE:** 8–10, 14–21, 25, 26, 29, 48, 50, 51, 53, 398–406, 408– 418, 435
Performance Expectation MS-PS1-3	
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	**SE/TE:** 428–435, 436–437, 438, 439 **Labs:** Making Plastic from Starch
Disciplinary Core Ideas	
PS1.A: Structure and Properties of Matter Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. **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.	**SE/TE:** 357, 412–413, 420, 422, 423, 427–435, 438–439, 442–445 **Labs:** Making Plastic from Starch
Science and Engineering Practices	
Obtaining, Evaluating, and Communicating Information 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 supported or not supported by evidence.	**SE/TE:** 428-435 **Labs:** Making Plastic from Starch
Crosscutting 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:** 428-435 **Labs:** Making Plastic from Starch

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Performance Expectation MS-PS1-4.	
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.	**SE/TE:** 43, 46–47, 55, 56, 58–59, 61, 63, 69, 70, 71, 72, 74, 76–77, 80–81, 82–85, 144
Disciplinary Core Ideas	
PS1.A: Structure and Properties of Matter • 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. **PS3.A: Definitions of Energy** • The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MSPS1- 4) • The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary to MS-PS1-4)	**SE/TE:** 30, 45A–45B, 47–54, 56–64, 78–79, 110–111, 116, 140–142, 143–145, 146–147, 148–153, 159–161, 166–167, 170–173, 222–229

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Science and Engineering Practices	
Developing and Using Models Develop and/or use a model to predict and/or describe phenomena.	**SE/TE:** 49–50, 54, 58–61, 63, 222–229
Crosscutting Concepts	
Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**SE/TE:** 49–50, 54, 58–61, 63 **TE Only:** 46–54, 56–64, 222–229
Performance Expectation MS-PS1-5.	
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.	**SE/TE:** 420-427 **Labs:** Is Matter Conserved?
Disciplinary Core Ideas	
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.	**SE/TE:** 410, 420-427
Science and Engineering Practices	
Developing and Using Models Develop a model to describe unobservable mechanisms. **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** Laws are regularities or mathematical descriptions of natural phenomena. **Analyzing and Interpreting Data** Analyze displays of data to identify linear and nonlinear relationships.	**SE/TE:** 420-427, 440-441
Crosscutting Concepts	
Energy and Matter Matter is conserved because atoms are conserved in physical and chemical processes.	**SE/TE:** 420-427

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Performance Expectation MS-PS1-6.	
Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	**SE/TE:** 396-397, 414, 415
Disciplinary Core Ideas	
PS1.B: Chemical Reactions Some chemical reactions release energy, others store energy. **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (secondary to MS-PS1-6) **ETS1.C: Optimizing the Design Solution** Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design. (secondary to MS-PS1-6) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary to MS-PS1-6)	**SE/TE:** 396-397, 414, 415
Science and Engineering Practices	
Constructing Explanations and Designing Solutions Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.	**SE/TE:** 396-397, 414, 415
Crosscutting Concepts	
Energy and Matter The transfer of energy can be tracked as energy flows through a designed or natural system.	**SE/TE:** 396-397, 414, 415
MS-PS2 Motion and Stability: Forces and Interactions	
Performance Expectation MS-PS2-1.	
Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.	**SE/TE:** 479, 494-497

Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
Disciplinary Core Ideas	
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).	**SE/TE:** 448-449, 471, 475-480, 490-491, 494-497
Science and Engineering Practices	
Constructing Explanations and Designing Solutions Apply scientific ideas or principles to design an object, tool, process or system.	**SE/TE:** 479, 494-497
Crosscutting 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. **Influence of Science, Engineering, and Technology on Society and the Natural World** 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.	**SE/TE:** 479, 494-497

Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
Performance Expectation MS-PS2-2.	
Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**SE/TE:** 494-497
Disciplinary Core Ideas MS-PS2-2.	
PS2.A: Forces and Motion 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:** 458-467, 470-478, 485
Science and Engineering Practices	
Planning and Carrying Out Investigations 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. **Connection to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 458-467, 470-478
Crosscutting Concepts	
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, including the atomic scale. **Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. **Systems and System Models** Models can be used to represent systems and their interactions.	**SE/TE:** 450–457, 458–467, 470–478, 480–488, 492–493

Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
Performance Expectation MS-PS2-3.	
Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	**SE/TE:** 236–239, 240–243, 258–265, 266–275, 276–281
Disciplinary Core Ideas	
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.	**SE/TE:** 236–239, 240–243, 248, 250–257, 258–264, 266–275, 276–281
Science and Engineering Practices	
Asking Questions and Defining Problems 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.	**SE/TE:** 236–239, 258–264, 266–275, 276–281
Crosscutting Concepts	
Cause and Effect: Mechanism and Prediction Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**SE/TE:** 236–239, 258–264, 266–275, 276–281
Performance Expectation MS-PS2-4.	
Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	**SE/TE:** 480-488
Disciplinary Core Ideas	
PS2.B: Types of Interactions 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.	**SE/TE:** 480-489

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Science and Engineering Practices	
Engaging in Argument from Evidence 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. **Connection to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 480-488
Crosscutting 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:** 480-488, 493
Performance Expectation MS-PS2-5.	
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.	**SE/TE:** 236–239, 239A–239B, 240–248, 250–257, 278–281, 282–285
Disciplinary Core Ideas	
PS2.B: Types of Interactions 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:** 236–239, 240–248, 250–257, 278–281, 282–285
Science and Engineering Practices	
Planning and Carrying Out Investigations 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.	**SE/TE:** 236–239, 239A–239B, 240–248, 250–257, 278–281, 282–285
Crosscutting Concepts	
Cause and Effect: Mechanism and Prediction Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**SE/TE:** 236–239, 240–248, 250–257, 278–281, 282–285

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Energy	
Performance Expectation MS-PS3-1.	
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.	**SE/TE:** 100–102, 125, 128 **Digital Activities**: Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
Disciplinary Core Ideas	
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.	**SE/TE:** 91, 99, 100–102, 108, 116, 118, 123, 125, 128 **Digital Activities**: Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
Science and Engineering Practices	
Analyzing and Interpreting Data Construct and interpret graphical displays of data to identify linear and nonlinear relationships.	**SE/TE:** 102 **Digital Activities:** Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
Crosscutting Concepts	
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.	**SE/TE:** 100-106, 123 **Digital Activities:** Racing for Kinetic Energy, Interpret Kinetic Energy Graphs
Performance Expectation MS-PS3-2.	
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.	**SE/TE:** 86–87, 88–89, 89A–89B, 100–106, 107, 117, 121, 125, 128–129, 130–135, 238–248, 250–257, 278–281, 282–285, 480–488
Disciplinary Core Ideas	
PS3.A: Definitions of Energy A system of objects may also contain stored (potential) energy, depending on their relative positions. **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.	**SE/TE:** 57, 90–99, 100–106, 128–129, 142–145, 238–248, 250–257, 278–281, 282–285, 458, 480–488, 490–491

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Science and Engineering Practices	
Developing and Using Models Develop a model to describe unobservable mechanisms.	**SE/TE:** 100–106, 238–248, 250–257, 278–281, 282–285, 480–488
Crosscutting 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:** 36–37, 63, 80–81, 100–106, 130–131, 238–248, 250–257, 278–281, 282–285, 480–488
Performance Expectation MS-PS3-3.	
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	**SE/TE:** 107, 117, 136–139, 155, 158, 166–167, 170–173
Disciplinary Core Ideas	
PS3.A: Definitions of Energy Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. **PS3.B: Conservation of Energy and Energy Transfer** Energy is spontaneously transferred out of hotter regions or objects and into colder ones. **ETS1.A: Defining and Delimiting an Engineering Problem** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (secondary to MS-PS3-3) **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. (secondary to MS-PS3-3)	**SE/TE:** 88–89, 90–99, 170–173, 501–502

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Science and Engineering Practices	
Constructing Explanations and Designing Solutions Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system.	**SE/TE:** 90–99
Crosscutting Concepts	
Energy and Matter The transfer of energy can be tracked as energy flows through a designed or natural system.	**SE/TE:** 136–139, 144, 146–147, 154, 166–167, 170–173
Performance Expectation MS-PS3-4.	
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.	**SE/TE:** 30, 31, 136–137, 140–146, 148–154, 156–157, 158–173
Disciplinary Core Ideas	
PS3.A: Definitions of Energy Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. **PS3.B: Conservation of Energy and Energy Transfer** 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.	**SE/TE:** 31, 90–99, 140–146, 148–154, 158–161, 163–165
Science and Engineering Practices	
Planning and Carrying Out Investigations 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. **Connection to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 82–85, 140–146, 148–154, 158–165

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Crosscutting Concepts	
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.	**SE/TE:** 140–146, 148–154, 158–165
Performance Expectation MS-PS3-5.	
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.	**SE/TE:** 86–87, 108–116, 118–125, 126–127, 128–137, 148–154, 158–169
Disciplinary Core Ideas	
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.	**SE/TE:** 108–116, 118–125, 148–154, 156–157, 158–165
Science and Engineering Practices	
Engaging in Argument from Evidence 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. **Connection to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 89A-89B, 108–116, 118–125, 148–154, 158–165
Crosscutting Concepts	
Energy and Matter Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).	**SE/TE:** 108–116, 118–125, 148–154, 158–165

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Waves and Electromagnetic Radiation	
Performance Expectation MS-PS4-1.	
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.	**SE/TE:** 174–177, 178–185, 228–231
Disciplinary Core Ideas	
PS4.A: Wave Properties A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.	**SE/TE:** 178–185, 198–207
Science and Engineering Practices	
Using Mathematics and Computational Thinking Use mathematical representations to describe and/or support scientific conclusions and design solutions. **Connection to Nature of Science** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**SE/TE:** 178–185, 310–311
Crosscutting Concepts	
Patterns Graphs and charts can be used to identify patterns in data.	**SE/TE:** 178–185, 315, 324–325

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Performance Expectation MS-PS4-2.	
Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	**SE/TE:** 190, 194, 201, 207, 210–211, 222–226, 232–235
Disciplinary Core Ideas	
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. • A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. • However, because light can travel through space, it cannot be a matter wave, like sound or water waves.	**SE/TE:** 188–196, 199–202, 207, 208–216, 218–227, 230–231
Science and Engineering Practices	
Developing and Using Models Develop and use a model to describe phenomena.	**SE/TE:** 188–196, 198–207, 208–216, 218–227, 318
Crosscutting 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:** 188–196, 198–207, 208–216, 218–227

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Performance Expectation MS-PS4-3.	
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.	**SE/TE:** 286–289, 290–298, 300–309, 310–311, 312–320, 322–325, 326–329
Disciplinary Core Ideas	
PS4.C: Information Technologies and Instrumentation Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.	**SE/TE:** 286–289, 290–298, 300–309, 312–320, 321, 322–325, 326–329
Science and Engineering Practices	
Obtaining, Evaluating, and Communicating Information Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings.	**SE/TE:** 286–289, 290–298, 300–309, 312–320, 322–325, 326–329
Crosscutting Concepts	
Structure and Function Structures can be designed to serve particular functions. **Connections to Engineering, Technology, and Applications of Science** Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. **Connections to Nature of Science** Advances in technology influence the progress of science and science has influenced advances in technology.	**SE/TE:** 286–289, 290–298, 300–309, 312–320, 322–325, 326–329

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MS-ETS1 Engineering Design	
Performance Expectation MS-ETS1-1.	
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.	**SE/TE:** 38–41, 55, 106, 396–397, 414, 415, 448–449, 507, 513 **Digital Activity:** Define Criteria and Constraints **EDN:** A Camera Without a Lens?, A Spacewalker's Toolkit
Disciplinary Core Ideas	
ETS1.A: Defining and Delimiting Engineering Problems The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.	**SE/TE:** 38–41, 55, 106, 396–397, 414, 415, 448–449, 507 **Digital Activity:** Design Your Pack **EDN:** Reaching out with Prosthetics, A Spacewalker's Toolkit
Science and Engineering Practices	
Asking Questions and Defining Problems Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.	**SE/TE:** 38–41, 55, 106, 396–397, 414, 415, 448–449, 513 **EDN:** Build a Soccer Practice Partner, A Spacewalker's Toolkit, Sticking a Soft Landing
Crosscutting Concepts	
Influence of Science, Engineering, and Technology on Society and the Natural World All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. The uses of technologies and 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.	**SE/TE:** 38–41, 55, 448–449, 532 **Labs:** Bumping Cars, Bumper Solutions **EDN:** Reaching out with Prosthetics, Spacewalker's Toolkit, A Camera Without a Lens?

Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
Performance Expectation MS-ETS1-2.	
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	**SE/TE:** 55, 106, 125, 165, 396–397, 414, 415, 448–449, 479, 489, 513, 540–543 **EDN:** Fire it Up, A Spacewalker's Toolkit, Sticking a Soft Landing
Disciplinary Core Ideas	
ETS1.B: Developing Possible Solutions There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.	**SE/TE:** 55, 106, 125, 165, 396–397, 414, 415, 448–449, 479, 489, 513, 540–543 **Labs:** Bumping Cars, Bumper Solutions, Heat It Up or Ice It Down, Keep the Cold Out, Keep the Heat In
Science and Engineering Practices	
Engaging in Argument from Evidence Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	**SE/TE:** 55, 106, 125, 165, 396–397, 414, 415, 448–449, 479, 489, 513, 540–543 **Labs:** Heat It Up or Ice It Down **EDN:** A Spacewalker's Toolkit, Sticking a Soft Landing

Next Generation Science Standards **Middle School Physical Science**	**Elevate Science** **Physical, ©2019**
Performance Expectation MS-ETS1-3.	
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.	**SE/TE:** 33, 116, 164–165, 170–173, 396–397, 414, 415, 427, 442–445, 489, 494–497, 507, 513 **Labs:** Bumping Cars, Bumper Solutions, Newton Scooters
Disciplinary Core Ideas	
ETS1.B: Developing Possible Solutions There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.	**SE/TE:** 33, 116, 165, 170–173, 413, 430–433, 442–445, 489, 513 **Labs:** Heat It Up or Ice It Down
Science and Engineering Practices	
Analyzing and Interpreting Data Analyze and interpret data to determine similarities and differences in findings.	**SE/TE:** 33, 116, 165, 170–173, 427, 442–445, 489, 494–497, 513 **Labs:** Heat It Up or Ice It Down **EDN:** A Spacewalker's Toolkit

Next Generation Science Standards Middle School Physical Science	Elevate Science Physical, ©2019
Performance Expectation MS-ETS1-4.	
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.	**SE/TE:** 33, 82–85, 106, 132–135, 154, 396–397, 414, 415, 424–425, 442–445, 448–449, 479, 489, 494–497, 507, 513, 540–543 **EDN:** Build a Magnetic Sorter, Reaching Out with Prosthetics, Sticking a Soft Landing
Disciplinary Core Ideas	
ETS1.B: Developing Possible Solutions A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) Models of all kinds are important for testing solutions. (MSETS1-4)	**SE/TE:** 33, 82–85, 106, 132–135, 154, 415, 424–425, 442–445, 448–449, 479, 489, 494–497, 507–508, 513, 540–543 **Labs:** Pack Building, Test and Evaluate a Chain-Reaction Machine, Heat It Up or Ice It Down, Pack Building **EDN:** Build a Magnetic Sorter, A Spacewalker's Toolkit
Science and Engineering Practices	
Developing and Using Models Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.	**SE/TE:** 33, 82–85,106, 132–135, 154, 415, 424–425, 442–445, 448–449, 479, 489, 494–497, 513, 540–543 **EDN:** Build a Magnetic Sorter, A Spacewalker's Toolkit, Sticking a Soft Landing