McGraw Hill Education

Alignment Guide

PHYSICAL iSCIENCE

GLENCOE

Glencoe Science—Your Partner in Understanding and Implementing NGSS*

Ease the Transition to Next Generation Science Standards

Meeting NGSS

Glencoe Science helps ease the transition to Next Generation Science Standards (NGSS). Our middle school science programs ensure you are fully aligned to:

- Performance Expectations
- Science and Engineering Practices
- Disciplinary Core Ideas
- Crosscutting Concepts

We are committed to ensuring that you have the tools and resources necessary to meet the expectations for the next generation of science standards.

What is NGSS?

The purpose of the NGSS Framework is to act as the foundation for science education standards while describing a vision of what it means to be proficient in science. It emphasizes the importance of the practices of science where the content becomes a vehicle for teaching the processes of science.

Why NGSS?

The NGSS were developed in an effort to create unified standards in science education that consider content, practices, pedagogy, curriculum, and professional development. The standards provide all students with an internationally benchmarked education in science.

Correlation of NGSS Performance Expectations to Physical Science

The Correlation Table lists a Performance Expectation that integrates a combination of Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

Performance Expectations

are tasks to evaluate student's knowledge. Each Performance Expectation is correlated to an Applying Practices activity written specifically for the purpose. These activities can be found in the resources for the section listed.

Science and Engineering Practices

are skills that scientists and engineers use in their work. Each Practice is correlated to a part of the Science and Engineering Practices Handbook, which can be found in the program resources.

Disciplinary Core Ideas

are the content knowledge students will need to learn. These are correlated to the main student text.

Crosscutting Concepts

are themes that appear throughout all branches of science and engineering. These are not directly correlated but are found implicitly in the other correlations listed on the page.

Find it here!

Code	Title/Text	Location
MS-LS1	From Molecules to Organisms: Structures and Processes	
MS-LS1-1	**Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.** Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.	Refer to the Project-Based Activity titled "It's Alive! Or is it?"
	The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*	
Science and Engineering Practices		
	Planning and Carrying Out Investigations Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.	
	• Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation.	**Student Edition:** Launch Lab 9, 43, 707 MiniLab 54, 103 Skill Practice 59 Lab 106-107
Disciplinary Core Ideas		
LS1.A	**Structure and Function**	
	• All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).	**Student Edition:** 10, 44, 98-100 **Teacher Edition:** GQ 10, 43, 99; SCB 40E; VL 99
Crosscutting Concepts		
	Scale, Proportion, and Quantity	
	• Phenomena that can be observed at one scale may not be observable at another scale.	**Student Edition:** Launch Lab 43 MiniLab 54 Skill Practice 59
	Connections to Engineering, Technology and Applications of Science **Interdependence of Science, Engineering, and Technology**	
	• Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.	**Student Edition:** Launch Lab 43 Skill Practice 59

Physical iScience

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions**	
MS-PS1-1	**Develop models to describe the atomic composition of simple molecules and extended structures.** **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, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms. **Assessment Boundary:** Assessment 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 is not required.	Refer to the Project-Based Activity titled "Model Molecules"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Developing and Using Models Modeling in 6-8 builds on K-5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.	
	• Develop and use a model to predict and/or describe phenomena.	**Student Edition:** Launch Lab 488 MiniLab 394, 423, 494 **Teacher Edition:** DI 259, 503, 511; TD 503, 511
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.	**Student Edition:** 233-234, 236, 258, 382, 390, 421, 490-495 **Teacher Edition:** GQ 233, 236, 258, 382; IM 416H; VL 234, 421
	• Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).	**Student Edition:** 274-275, 491, 503-504 **Teacher Edition:** GQ 275; VL 491, 503, 504
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.	Refer to the Project-Based Activity titled "Model Molecules"

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions** *continued*	
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.** Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride. Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.	Refer to the Project-Based Activity titled "A Tale of Two Changes"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Analyzing and Interpreting Data Analyzing data in 6-8 builds on K-5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	
	• Analyze and interpret data to determine similarities and differences in findings.	**Student Edition:** Launch Lab 256, 436 Skill Practice 247, 428 **Teacher Edition:** DI 421; TD 255, 419
	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.	**Student Edition:** Launch Lab 256, 436 Skill Practice 247, 428 **Teacher Edition:** DI 421; TD 255, 419
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.	**Student Edition:** 240-245, 256, 273 **Teacher Edition:** GQ 256; IM 228H
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.	**Student Edition:** 234, 257-258, 390, 421, 434 **Teacher Edition:** GQ 258, 390; IM 416H; VL 421
Crosscutting Concepts		
	Patterns	
	• Macroscopic patterns are related to the nature of microscopic and atomic-level structure.	**Teacher Edition:** DI 421; TD 419

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Physical iScience continued

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions** *continued*	
MS-PS1-3	**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.** 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. Assessment Boundary: Assessment is limited to qualitative information.	Refer to the Project-Based Activity titled "Protect Your Noggin"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods.	
	• 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 now supported by evidence.	Refer to the Project-Based Activity titled "Protect Your Noggin"
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.	**Student Edition:** 240-245, 256, 273 **Teacher Edition:** GQ 256; IM 228H
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.	**Student Edition:** 234, 257-258, 390, 421 **Teacher Edition:** GQ 258, 390; IM 416H; VL 421

Note: Correlation continues on the next page

Physical iScience continued

Code	Title/Text	Location
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.	**Student Edition:** 156-157, 497, 503-504 MiniLab 157 **Teacher Edition:** DI 157; TD 505
	Connections to Engineering, Technology, and Applications of Science **Interdependence of Science, Engineering, and Technology**	
	• Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.	**Student Edition:** 156-157, 497, 503-504 MiniLab 157 **Teacher Edition:** DI 157; TD 505
	Connections to Engineering, Technology, and Applications of Science **Influence of Science, Engineering and Technology on Society and the Natural World**	
	• The uses of technologies and any limitation 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. Thus technology use varies from region to region and over time. (MS-PS1-3)	**Student Edition:** 156-157, 497, 503-504 MiniLab 157 **Teacher Edition:** DI 157; TD 505

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Physical iScience continued

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions** *continued*	
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.** 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.	Refer to the Project-Based Activity titled "Particles in Motion"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Developing and Using Models Modeling in 6-8 builds on K-5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.	
	• Develop a model to predict and/or describe phenomena.	**Student Edition:** MiniLab 209, 288 **Teacher Edition:** DI 241, 277, 285; TD 241, 279
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.	**Student Edition:** 241, 276-278, 282-283, 292 **Teacher Edition:** GQ 278; IM 270H; SCB 270E; VL 241, 274, 276, 278
	• 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.	**Student Edition:** 241, 274-278, 292 **Teacher Edition:** GQ 241; IM 270H; SCB 270E; VL 241, 274, 276, 278
	• The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.	**Student Edition:** 250-251, 284-287 **Teacher Edition:** GQ 250, 251, 284, 285, 287; SCB 270E-F; VL 250, 285, 287
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)	**Student Edition:** 201, 205 **Teacher Edition:** GQ 194, 196, 200, 205; SCB 194E; VL 201
	• Temperature is not a measure of energy; the relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (secondary to MS-PS1-4)	**Student Edition:** 199-200, 282-283 **Teacher Edition:** GQ 199, 282, 283; IM 194H, 270H; SCB 194E; VL 198

Note: Correlation continues on the next page

Code	Title/Text	Location
Crosscutting Concepts		
	Cause and Effect	
	• Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**Student Edition:** MiniLab 288 **Teacher Edition:** DI 241, 277, 285

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CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions** *continued*	
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.** **Clarification Statement:** Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms. **Assessment Boundary:** Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.	Refer to the Project-Based Activity titled "All Things Being Equal"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Developing and Using Models Modeling in 6-8 builds on K-5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.	
	• Develop a model to describe unobservable mechanisms.	**Student Edition:** Launch Lab 419 **Teacher Edition:** TD 427
	Connections to Nature of Science **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**	
	• Laws are regularities or mathematical descriptions of natural phenomena.	**Student Edition:** Launch Lab 419 **Teacher Edition:** MS 423
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.	**Student Edition:** 234, 257-258, 390, 421 **Teacher Edition:** GQ 258, 390; IM 416H; VL 421
	• The total number of each type of atom is conserved, and thus the mass does not change.	**Student Edition:** 258-259, 424-425 **Teacher Edition:** GQ 424, 425; VL 425
Crosscutting Concepts		
	Energy and Matter	
	• Matter is conserved because atoms are conserved in physical and chemical processes.	**Student Edition:** 252, 258-259, 288, 424-425 Launch Lab 419 **Teacher Edition:** TD 253, 427

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS1	**Matter and Its Interactions** *continued*	
MS-PS1-6	**Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*** **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. **Assessment Boundary:** Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.	Refer to the Project-Based Activity titled "Warm It Up!"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6-8 builds on K-5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.	
	• Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.	Refer to the Project-Based Activity titled "Warm It Up!"
Disciplinary Core Ideas		
PS1.B	**Chemical Reactions**	
	• Some chemical reactions release energy, others store energy.	**Student Edition:** 420, 434, 436-437 **Teacher Edition:** GQ 435, 437; VL 420, 437
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.	Refer to the Project-Based Activity titled "Warm It Up!"
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)	Refer to the Project-Based Activity titled "Warm It Up!"
	• 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)	Refer to the Project-Based Activity titled "Warm It Up!"
Crosscutting Concepts		
	Energy and Matter	
	• The transfer of energy can be tracked as energy flows through a designed or natural system.	**Student Edition:** Launch Lab 436 **Teacher Edition:** DI 437

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AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
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CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS2	**Motion and Stability: Forces and Interactions**	
MS-PS2-1	**Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*** **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. **Assessment Boundary:** Assessment is limited to vertical or horizontal interactions in one dimension.	Refer to the Project-Based Activity titled "Cracking Up"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6-8 builds on K-5 experiences and progresses to include constructing explanations and designing solutions by multiple sources of evidence consistent with scientific ideas, principles, and theories.	
	• Apply scientific ideas or principles to design an object, tool, process or system.	Refer to the Project-Based Activity titled "Cracking Up"
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).	**Student Edition:** 70-72 **Teacher Edition:** GQ 70, 71, 72; IM 42H; SCB 42F; VL 72
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.	**Student Edition:** Lab 76-77 **Teacher Edition:** TD 75
	Connections to Engineering, Technology, and Applications of Science **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.	Refer to the Project-Based Activity titled "Cracking Up"

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS2	**Motion and Stability: Forces and Interactions** *continued*	
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.** **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. **Assessment Boundary:** Assessment is 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.	Refer to the Project-Based Activity titled "Putting the Shot in Motion"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.	
	• 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.	**Student Edition:** Lab 76-77 **Teacher Edition:** TD 53, 57, 61, 63
	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.	**Student Edition:** Lab 76-77 **Teacher Edition:** TD 53, 57, 61, 63
Disciplinary Core Ideas		
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.	**Student Edition:** 54-57, 62-65 **Teacher Edition:** GQ 55, 56, 62, 63; VL 63
	• 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.	**Student Edition:** 9-13, 15, 55 **Teacher Edition:** GQ 10, 11, 12; SCB 6E; VL 10
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.	Refer to the Project-Based Activity titled "Putting the Shot in Motion"

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Physical iScience continued

Code	Title/Text	Location
MS-PS2	**Motion and Stability: Forces and Interactions** *continued*	
MS-PS2-3	**Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.** **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. **Assessment Boundary:** Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking	Refer to the Project-Based Activity titled "The Great Metal Pick-Up Machine"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Asking Questions and Defining Problems Asking questions and defining problems in grades 6-8 builds from grades K-5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.	
	• 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.	**Student Edition:** MiniLab 730, 737 Lab 706-707; 742-743 **Teacher Edition:** DI 719
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.	**Student Edition:** 680-681, 688, 718, 728-729 **Teacher Edition:** GQ 680, 681, 718; IM 676H; SCB 714E; VL 681
Crosscutting Concepts		
	Cause and Effect	
	• Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**Student Edition:** MiniLab 730, 737 Lab 706-707 **Teacher Edition:** DI 719, 723

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Code	Title/Text	Location
MS-PS2	**Motion and Stability: Forces and Interactions** *continued*	
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.** **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. **Assessment Boundary:** Assessment does not include Newton's Law of Gravitation or Kepler's Laws	Refer to the Project-Based Activity titled "Gravity! It's attractive!"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Engaging in Argument from Evidence Engaging in argument from evidence in 6-8 builds from K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world.	
	• 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.	**Student Edition:** 52 **Teacher Edition:** DI 47
	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.	**Student Edition:** 52 **Teacher Edition:** DI 47
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.	**Student Edition:** 47, 52 **Teacher Edition:** GQ 47; SCB 42E; VL 47
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.	**Student Edition:** 47 **Teacher Edition:** DI 47

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CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS2	**Motion and Stability: Forces and Interactions** *continued*	
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.** 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 first-hand experiences or simulations. Assessment Boundary: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.	Refer to the Project-Based Activity titled "Hands Off!"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.	
	• 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.	**Student Edition:** Launch Lab 54, 679, 727, 735 MiniLab 682 **Teacher Edition:** DI 683, 719
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).	**Student Edition:** 680-681, 683, 719-720, 725 **Teacher Edition:** IM 676H, 714H
Crosscutting Concepts		
	Cause and Effect	
	• Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**Student Edition:** Launch Lab 54, 679, 727, 735 MiniLab 682 **Teacher Edition:** DI 683, 719

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
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Physical iScience continued

Code	Title/Text	Location
MS-PS3	**Energy**	
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.** 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.	Refer to the Project-Based Activity titled “Energy in Motion”
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Analyzing and Interpreting Data Analyzing data in 6-8 builds on K-5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	
	• Construct and interpret graphical displays of data to identify linear and nonlinear relationships.	Refer to the Project-Based Activity titled “Energy in Motion”
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.	**Student Edition:** 162, 170, 197 **Teacher Edition:** GQ 162, 197
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.	**Student Edition:** MiniLab 173

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CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS3	**Energy** *continued*	
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.** **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 cart 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. **Assessment Boundary:** Assessment is limited to two objects and electric, magnetic, and gravitational interactions.	Refer to the Project-Based Activity titled "Physics Day at the Amusement Park"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Developing and Using Models Modeling in 6-8 builds on K-5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.	
	• Develop a model to describe unobservable mechanisms.	**Student Edition:** MiniLab 173 **Teacher Edition:** DI 163; TD 169
Disciplinary Core Ideas		
PS3.A	**Definitions of Energy**	
	• A system of objects may also contain stored (potential) energy, depending on their relative positions.	**Student Edition:** 162-163, 197, 283 **Teacher Edition:** GQ 163, 197; VL 283
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.	**Student Edition:** 161-164 **Teacher Edition:** GQ 164; SCB 158E
Crosscutting Concepts		
	System 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.	**Student Edition:** MiniLab 173 **Teacher Edition:** TD 169

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS3	Energy *continued*	
MS-PS3-3	**Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*** **Clarification Statement:** Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup. **Assessment Boundary:** Assessment does not include calculating the total amount of thermal energy transferred.	Refer to the Project-Based Activity titled "Cookin' with the Sun"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6-8 builds on K-5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	
	• Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system.	**Student Edition:** Lab 220-221
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.	**Student Edition:** 199-200, 282-283 **Teacher Edition:** GQ 198, 199, 282; IM 194H, 270H; SCB 194E
PS3.B	**Conservation of Energy and Energy Transfer**	
	• Energy is spontaneously transferred out of hotter regions or objects and into colder ones.	**Student Edition:** 201, 206 **Teacher Edition:** GQ 194, 196, 200, 206; SCB 194E; VL 201
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)	**Student Edition:** 586 **Teacher Edition:** CIS 553; VL 586
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)	Refer to the Project-Based Activity titled "Cookin' with the Sun"
Crosscutting Concepts		
	Energy and Matter	
	• The transfer of energy can be tracked as energy flows through a designed or natural system.	**Student Edition:** Skill Practice 203 Lab 220-221 **Teacher Edition:** TD 205, 207

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS3	**Energy** *continued*	
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.** **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. **Assessment Boundary:** Assessment does not include calculating the total amount of thermal energy transferred.	Refer to the Project-Based Activity titled “SCI: Science Camp Investigation”
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.	
	• 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.	Refer to the Project-Based Activity titled “SCI: Science Camp Investigation”
	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	**Teacher Edition:** TD 199
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.	**Student Edition:** 199-200, 282-283 **Teacher Edition:** GQ 198, 199, 282; IM 194H, 270H; SCB 194E
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.	**Student Edition:** 205-211 **Teacher Edition:** GQ 207; IM 194H; SCB 194E
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.	Refer to the Project-Based Activity titled “SCI: Science Camp Investigation”

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS3	**Energy** *continued*	
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.** **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. **Assessment Boundary:** Assessment does not include calculations of energy.	Refer to the Project-Based Activity titled "Tearin' It Up!"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Engaging in Argument from Evidence Engaging in argument from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.	
	• 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.	**Student Edition:** Skill Practice 175 **Teacher Edition:** DI 171
	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	**Student Edition:** Skill Practice 175 **Teacher Edition:** DI 171; TD 173
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.	**Student Edition:** 170-173 **Teacher Edition:** GQ 170
Crosscutting Concepts		
	Energy and Matter	
	• Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).	**Student Edition:** Skill Practice 175 **Teacher Edition:** DI 171; TD 173

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
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CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS4	**Waves and their Applications in Technologies for Information Transfer**	
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.** **Clarification Statement:** Emphasis is on describing waves with both qualitative and quantitative thinking. **Assessment Boundary:** Assessment does not include electromagnetic waves and is limited to standard repeating waves.	Refer to the Project-Based Activity titled "Don't Make Waves!"
	The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*	
Science and Engineering Practices		
	Using Mathematics and Computational Thinking Mathematical and computational thinking at the 6-8 level builds on K-5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.	
	• Use mathematical representations to describe and/or support scientific conclusions and design solutions.	**Student Edition:** Skill Practice 545 **Teacher Edition:** DI 541
	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.	**Student Edition:** Skill Practice 545 **Teacher Edition:** DI 541
Disciplinary Core Ideas		
PS4.A	**Wave Properties**	
	• A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.	**Student Edition:** 539-542, 573-575 **Teacher Edition:** GQ 539, 541, 542, 573, 575; IM 526H; SCB 526E; VL 540
Crosscutting Concepts		
	Patterns	
	• Graphs and charts can be used to identify patterns in data.	**Student Edition:** Skill Practice 545 **Teacher Edition:** DI 541

LOCATION ABBREVIATION KEY

AC	Activity	**FF**	Fun Fact	**RS**	Reading Strategy	**TA**	Technology Activity
CD	Cultural Diversity	**GQ**	Guiding Questions	**RWS**	Real-World Science	**TD**	Teacher Demo
CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS4	**Waves and their Applications in Technologies for Information Transfer** *continued*	
MS-PS4-2	**Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.** **Clarification Statement:** Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions. **Assessment Boundary:** Assessment is limited to qualitative applications pertaining to light and mechanical waves.	Refer to the Project-Based Activity titled "Build a Better Room"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Developing and Using Models Modeling in 6-8 builds on K-5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.	
	• Develop and use a model to describe phenomena.	**Student Edition:** MiniLab 645 Skill Practice 648 Lab 668-669 **Teacher Edition:** DI 549, 585, 637; TD 583, 635, 645
Disciplinary Core Ideas		
PS4.A	**Wave Properties**	
	• A sound wave needs a medium through which it is transmitted.	**Student Edition:** 534, 565-566 **Teacher Edition:** GQ 543; IM 562H; VL 534
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.	**Student Edition:** 547-549, 635-639, 643-646 **Teacher Edition:** GQ 548, 636, 638; IM 526H; VL 637
	• 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.	**Student Edition:** 550, 636, 650-655 **Teacher Edition:** GQ 550, 650, 651, 653, 654; IM 526H; SCB 632F; VL 653, 654
	• A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media.	**Student Edition:** 550, 635, 638-639, 650-651, 654-655 **Teacher Edition:** GQ 550, 634, 650, 654; RWS 639; SCB 632E; VL 655
	• However, because light can travel through space, it cannot be a matter wave, like sound or water waves.	**Student Edition:** 535, 601, 607 **Teacher Edition:** GQ 535, 601; SCB 598E

Note: Correlation continues on the next page

Physical iScience continued

Code	Title/Text	Location
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.	**Student Edition:** Lab 668-669 **Teacher Edition:** DI 549, 585; TD 583, 635, 645

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CIS	Careers in Science	**IWB**	Interactive Whiteboard Strategy	**SCB**	Science Content Background	**VL**	Visual Literacy
DI	Differentiated Instruction	**MS**	Math Skills				

Physical iScience continued

Code	Title/Text	Location
MS-PS4	**Waves and their Applications in Technologies for Information Transfer** *continued*	
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** **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 wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen. **Assessment Boundary:** Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.	Refer to the Project-Based Activity titled "Out with the Old, In with the New"
The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*		
Science and Engineering Practices		
	Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods.	
	• Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings.	**Teacher Edition:** DI 617, 619
Disciplinary Core Ideas		
PS3.C	**Information Technologies and Instrumentation**	
	• Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.	**Student Edition:** 15, 609-610, 615-618, 666 **Teacher Edition:** GQ 616; RWS 535, 589; SCB 598F
Crosscutting Concepts		
	Structure and Function	
	• Structures can be designed to serve particular functions.	**Teacher Edition:** DI 617, 619
	Connections to Engineering, Technology, and Applications of Science **Influence of Science, Engineering and Technology on Society and the Natural World**	
	• Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations.	**Teacher Edition:** DI 617, 619
	Connections to Nature of Science **Science is a Human Endeavor**	
	• Advances in technology influence the progress of science and science has influenced advances in technology.	**Teacher Edition:** DI 617, 619

LOCATION ABBREVIATION KEY

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