Science A-Z

MIDDLE SCHOOL—PHYSICAL SCIENCE

Correlation with National Science Standards

Use the chart below to find Science A–Z units that best support the Next Generation Science Standards for Middle School Physical Science, and several featured resources from those units that provide strong connections. Each Performance Expectation in the chart represents all three dimensions: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.*

NOTE: Science A–Z resources primarily align with standards in grades K-5. However, the units and resources listed below provide a foundation for statisfying middle school standards.

Middle School Physical Science Topics: "How can particles combine to produce a substance with different properties? How does thermal energy affect particles? What happens when new materials are formed? What stays the same and what changes? How can one describe physical interactions between objects and within systems of objects? How can energy be transferred from one object or system to another? What are the characteristic properties of waves and how can they be used?"

MS. Structure and Properties of Matter		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.	PS1.A: Structure and Properties of Matter	**5–6 Mixing Matter** (Nonfiction Books; *Dmitri's Table* FOCUS Book; *Curious Marie Curie* FOCUS Book; *What Is Matter Made Of?* Interactive Science Lesson)
MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	PS1.A: Structure and Properties of Matter	**5–6 Mixing Matter** (Nonfiction Books) **5–6 Energy Resources** (Nonfiction Books) **3–4 Minerals, Rocks, and Soil** (*Nonliving Resources* Quick Reads)
	PS1.B: Chemical Reactions	**5–6 Mixing Matter** (Nonfiction Books; *Concrete* Quick Reads; *Alloys* Quick Reads)
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.	PS1.A: Structure and Properties of Matter	**5–6 Water** (Nonfiction Books; Fiction Books; *Water Cycle Model* Process Activity) **3–4 Solids, Liquids, and Gases** (*Changing States of Water* Process Activity; *Changing States of Matter* Interactive Science Lesson)
	PS3.A: Definitions of Energy	**5–6 Mixing Matter** (*The Science of Baking* FOCUS Book) **5–6 Thermometers** (*Measuring Water and Air Temperature* Process Activity) **3–4 Heat Energy** (Nonfiction Books)

** Next Generation Science Standards is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards was involved in the production of, and does not endorse, this product.*

MS. Chemical Reactions		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
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.	PS1.A: Structure and Properties of Matter	**5–6 Mixing Matter** (Nonfiction Books; *Chemical Changes* Investigation Pack)
	PS1.B: Chemical Reactions	**5–6 Mixing Matter** (*The Science of Lemonade* FOCUS Book; *The Science of Baking* FOCUS Book)
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.	PS1.B: Chemical Reactions	**5–6 Mixing Matter** (Nonfiction Books; *Chemical Changes* Investigation Pack; *Curious Marie Curie* FOCUS Book)
MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	PS1.B: Chemical Reactions	**5–6 Mixing Matter** (*Chemical Changes* Investigation Pack)
	ETS1.B: Developing Possible Solutions	Resources to be developed
	ETS1.C: Optimizing the Design Solution	Resources to be developed

MS. Forces and Interactions		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	PS2.A: Forces and Motion	**5–6 Force and Motion** (Nonfiction Books; *Soccer* FOCUS Book; *Motion in Sports* Quick Reads)
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.	PS2.A: Forces and Motion	**5–6 Force and Motion** (Nonfiction Books; *Roller Coasters* FOCUS Book; *Design Your Own Amusement Park Ride* Project-Based Learning Pack; *Changing States of Matter* Interactive Science Lesson)

Section continued on next page

MS. Forces and Interactions (continued)		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	PS2.B: Types of Interactions	**5–6 Electricity and Magnetism** (Nonfiction Books; *Electromagnets* Process Activity)
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.	PS2.B: Types of Interactions	**5–6 Force and Motion** (Nonfiction Books; *Gravity in the Solar System* FOCUS Book; *Rubberband Forces: Energy and Mass* Process Activity; *Weightless* Quick Reads)
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.	PS2.B: Types of Interactions	**5–6 Electricity and Magnetism** (Nonfiction Books; *Electromagnets* Process Activity; *Earth as a Magnet* Quick Reads)

MS. Energy		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
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.	PS3.A: Definitions of Energy	**5–6 Force and Motion** (Nonfiction Books; *Racecars* FOCUS Book)
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.	PS3.A: Definitions of Energy	**5–6 Force and Motion** (*Roller Coasters* FOCUS Book; *Rubberband Forces: Energy and Mass* Process Activity)
	PS3.C: Relationship Between Energy and Forces	**5–6 Force and Motion** (*Perpetual Motion: Fact or Fiction?* FOCUS Book) **3–4 Machines** (*Wrecking Ball vs. Strong Wall* FOCUS Book)

Section continued on next page

MS. Energy (continued)		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	PS3.A: Definitions of Energy	**3–4 Heat Energy** (Nonfiction Books; *Thermal Energy Transfer* Interactive Science Lesson)
	PS3.B: Conservation of Energy and Energy Transfer	**3–4 Heat Energy** (*Get Cool, Stay Cool* FOCUS Book; *Get Warm, Stay Warm* FOCUS Book; *Thermal Energy Transfer* Interactive Science Lesson)
	ETS1.A: Defining and Delimiting an Engineering Problem	**5–6 Energy Resources** (*Solar Cooker* Process Activity)
	ETS1.B: Developing Possible Solutions	**3–4 Heat Energy** (*Observe Convection Currents* Process Activity; *Insulate an Ice Cube* Process Activity)
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.	PS3.A: Definitions of Energy	**3–4 Heat Energy** (*Campfire Science* FOCUS Book; *The Heat of Kilauea* FOCUS Book)
	PS3.B: Conservation of Energy and Energy Transfer	**3–4 Heat Energy** (Nonfiction Books; *Science Friction* FOCUS Book)
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.	PS3.B: Conservation of Energy and Energy Transfer	**5–6 Force and Motion** (*Roller Coasters* FOCUS Book; *Perpetual Motion: Fact or Fiction?* FOCUS Book; *Rubberband Forces: Energy and Mass* Process Activity)

MS. Waves and Electromagnetic Radiation		
Performance Expectations	**Disciplinary Core Ideas**	**Science A–Z Units** (Featured Resources)
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.	PS4.A: Wave Properties	**5–6 Light Energy** (Nonfiction Books; *Radiant Energy* Investigation Pack) **3–4 Sound** (Nonfiction Books; *Seeing Sound* FOCUS Book; *Shhh!* FOCUS Book; *Wave Properties* Interactive Science Lesson)
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	PS4.A: Wave Properties	**3–4 Sound** (Nonfiction Books; *Properties of Sound* Investigation Pack; *Shhh!* FOCUS Book)
	PS4.B: Electromagnetic Radiation	**5–6 Light Energy** (Nonfiction Books; *How Light Interacts with Objects* Science Diagram; *Refraction* Process Activity; *Explore Shadows* Process Activity; *Spinning Color Disks* Process Activity; *Telescopes* Quick Reads)
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.	PS4.C: Information Technologies and Instrumentation	**5–6 Light Energy** (*DVDs* Quick Reads) **3–4 Sound** (*Properties of Sound* Investigation Pack; *CDs: Sound from Light* Quick Reads)