Performance Expectations at a Glance

In this unit, students will discover and practice the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts needed to perform the following Performance Expectations.

Performance Expectations	Module: **Energy and Matter**	Module: **The Water Cycle**	Module: **Weather and Climate**
MS-PS3-3	●		
MS-PS3-4	●		
MS-PS3-5	●		
MS-ESS2-4		●	
MS-ESS2-5			●
MS-ESS2-6			●
MS-ETS1-1	●		
MS-ETS1-2	●		
MS-ETS1-3	●		
MS-ETS1-4	●		

Correlations by Module to the NGSS

MODULE: Energy and Matter

MS-PS3	Energy	
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.*]	91–98

SEP 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. (MS-PS3-3) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.	*84–85*, 91–98, Lab *Build Your Own Thermometer* (online)

Labs and investigations are in italics.

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DCI 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. (MS-PS3-3), (MS-PS3-4)	17–18, *21–24,* 24, 26–28, *37–39,* 42, *45–46,* 46, *47–48,* 48
PS3.B: Conservation of Energy and Energy Transfer • Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)	*58–59,* 60–61, 70
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)	91–98, Science and Engineering Practices Handbook (online)
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)	91–98, Science and Engineering Practices Handbook (online)
CCC Crosscutting Concepts	
Energy and Matter* • The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.	59–61, *62–63,* 68, 70
CCSS ELA/Literacy Connections	
ELA RST.6–8.3	*10–11, 21–24, 34–36, 58–59, 62–63, 64, 76–78, 79–80,* 91–98, Literacy Skill Handbook (online)
ELA WHST.6–8.7	25, 49, 87, Literacy Skill Handbook (online)

MS-PS3	Energy	
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.*]	*76–78, 79–80, 84–85,* 91–98

Labs and investigations are in italics.

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SEP 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. (MS-PS3-4) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.	69, *84–85,* 91–98
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. (MS-PS3-4)	*10–11, 21–24,* 27, *37–39, 84–85*
DCI 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. (MS-PS3-4)	17–18, *21–24,* 24, 27–28, *37–39,* 42, *45,* 46, *47–48,* 48, Lab *Build Your Own Thermometer* (online)
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. (MS-PS3-4)	59, *76–78,* 78, *79–80, 81,* 82–83, 86, 88, 91–98
CCC 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. (MS-PS3-4) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.	17–18, 26–28, *76–78,* 78, *81*
CCSS ELA/Literacy Connections	
ELA RST.6–8.3	*10–11, 21–24, 34–36, 58–59, 62–63, 64, 76–78, 79–80,* 91–98, Literacy Skill Handbook (online)
ELA WHST.6–8.7	25, 49, 87, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	*19, 20, 34–36, 47–48, 76–78,* Math Skill Handbook (online)
Math 6.SP.B.5	*36–38, Math Skill Handbook (online)*

Labs and investigations are in italics.

MS-ETS1	Engineering Design	
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.**	91–98

SEP Science and Engineering Practices	
Developing and Using Models* Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.	91–98
DCI 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)	Science and Engineering Practices Handbook (online)
• Models of all kinds are important for testing solutions. (MS-ETS1-4)	91–98, Science and Engineering Practices Handbook (online)
ETS1.C: Optimizing the Design Solution 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. (MS-ETS1-4)	Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections	
ELA SL.8.5	91–98, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	*19, 20, 36–38, 47–48, 78,* Math Skill Handbook

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	25, *84–85,* 87, 99
SEP Developing and Using Models	*10–11*, 14, 17, 26–27, 43, 48, 55, 60–61, *62–63,* 68, 70, 78, 91–98, PhET Interactive Simulation *Energy Forms and Change* (online)
SEP Planning and Carrying Out Investigations	*58–59, 62–63, 64,* 69, *76–78, 79–80, 84–85,* 91–98

Labs and investigations are in italics.

MS-PS3	Energy	
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.*]	91–98
SEP 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. (MS-PS3-5) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		24, 28, 44, 88–90, 91–98, Feature *Insulating the Home* (online)
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. (MS-PS3-5)		*10–11*, *21–24*, 27, *37–39*, *84–85*
DCI 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. (MS-PS3-5)		*13*, 14, *16*, 17, *19*, *20*, 21, 26–27, 61, 91–98
CCC Crosscutting Concepts		
Energy and Matter* • Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion). (MS-PS3-5) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.		14, 24, 28, 42–43, *47–48*, 48
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		8–9, 15, 32–32, 56–57, 74–75, Literacy Skill Handbook (online)
ELA WHST.6–8.1		24, 28, 44, 90, 91–98, Feature *Insulating the Home* (online), Literacy Skill Handbook (online)

Labs and investigations are in italics.

Next Generation Science Standards

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CCSS Math Connections	
Math MP.2	*19, 20, 34–36, 47–48, 76–78,* Math Skill Handbook (online)
Math 6.RP.A.1	*81,* Math Skill Handbook (online)

MS-ETS1	**Engineering Design**	
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.**	91–98
SEP Science and Engineering Practices		
Asking Questions and Defining Problems* Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, clarifying arguments and models. • 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. (MS-ETS1-1) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		91–98
DCI 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. (MS-ETS1-1)		25, 91–98, Science and Engineering Practices Handbook (online)
CCC Crosscutting Concepts		
Connections to Science, Technology, Society and the Environment **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. (MS-ETS1-1)		91–98
• 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. (MS-ETS1-1)		25, 66, 91–98, Lab *Build Your Own Thermometer* (online)

Labs and investigations are in italics.

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CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 15, 32–32, 56–57, 74–75, Literacy Skill Handbook (online)
ELA WHST.6–8.8	66, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	*19, 20, 34–36, 47–48, 76–78,* Math Skill Handbook (online)

MS-ETS1	**Engineering Design**	
MS-ETS1-2.	**Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**	91–98
SEP 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 world. • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		91–98
DCI 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. (MS-ETS1-2) possible solutions. (MS-ETS1-1)		91–98, Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		8–9, 15, 32–32, 56–57, 74–75, Literacy Skill Handbook (online)
ELA RST.6–8.9		48, 91–98, Literacy Skill Handbook (online)
ELA WHST.6–8.7		25, 49, 87, Literacy Skill Handbook (online)
ELA WHST.6–8.9		15, Literacy Skill Handbook (online)

Labs and investigations are in italics.

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CCSS Math Connections	
Math MP.2	*19, 20, 34–36, 47–48, 76–78,* Math Skill Handbook (online)

MS-ETS1	Engineering Design	
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.**	91–98
SEP Science and Engineering Practices		
Analyzing and Interpreting Data* Analyzing data in 6–8 builds on K–5 experiences 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. (MS-ETS1-3) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		*62–63*, 91–98
DCI 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. (MS-ETS1-3)		91–98, Science and Engineering Practices Handbook (online)
• Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)		Science and Engineering Practices Handbook (online)
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 those characteristics may be incorporated into the new design. (MS-ETS1-3)		91–98, Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		8–9, 15, 32–33, 56–57, 74–75, Literacy Skill Handbook (online)
ELA RST.6–8.7		*47–48,* 50, 88, Literacy Skill Handbook (online)
ELA RST.6–8.9		48, 91–98, Literacy Skill Handbook (online)
CCSS Math Connections		
Math MP.2		*19, 20, 34–36, 47–48, 76–78,* Math Skill Handbook (online)

Labs and investigations are in italics.

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SEP Analyzing and Interpreting Data	*34–36, 37–39, 45–46,* 51, *58–59, 64, 76–78, 79–80,* 89, 91–98
SEP Using Mathematics and Computational Thinking	*34–36, 76–78, 81*
SEP Constructing Explanations and Designing Solutions	8–9, 18, 27–28, 32–33, 41, 52, 56–57, 65, 74–75, *84–85,* 86, 91–98, 99
SEP Engaging in Argument from Evidence	24–25, 28, 44, 90, 91–98, Feature *Insulating the Home* (online)
SEP Obtaining, Evaluating, and Communicating Information	15, 87, 91–98
Connections to Nature of Science Scientific Investigations Use a Variety of Methods	69, *84–85*, 91–98
Connections to Nature of Science Scientific Knowledge is Open to Revision in Light of New Evidence	15
DCI ESS2.A: Earth's Materials and Systems	65
DCI ESS2.C: The Roles of Water in Earth's Surface Processes	40, 67
DCI ESS2.D: Weather and Climate	82
DCI PS1.A: Structure and Properties of Matter	*10–11,* 11, *13,*14–15, *16,* 17–18, *19,* 19, *20,* 20, 25–28, *34–36,* 37, *37–39,* 40–41, *41–42,* 42–44, *45–46,* 46, *47–48,* 49–52
DCI PS2.A: Forces and Motion	12, 14, 17–18
CCC Patterns	*34–36, 37–39,* 41, *45*–46, *58–59, 67, 76*–78, *81,* 91–98
CCC Cause and Effect	*10–11, 21–24*
CCC Scale Proportion, and Quantity	*10–11,* 14, 17, 26–28
CCC Systems and System Models	59, 60, 61, *62–63*, 91–98
CCC Energy and Matter	14, 17, 18, 65, *67*, 67, 83, 86, 89
CCC Structure and Function	49, 87, 91–98
CCC Stability and Change	*10–11*
Connections to Science, Technology, Society, and the Environment Interdependence of Science, Engineering, and Technology	25, 87
CCSS ELA SL.6.4	25, 87, 91–98
CCSS ELA SL.6.5	25, 66
CCSS ELA RST.6–8.2	15
CCSS ELA RST.6–8.6	91–98

Labs and investigations are in italics.

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CCSS ELA RST.6–8.10	15, 25, 49, 66, 87
CCSS ELA WHST.6–8.3	*84–85,* 91–98
CCSS ELA WHST.6–8.5	91–98
CCSS ELA WHST.6–8.6	66
CCSS ELA WHST.6–8.8	66
CCSS ELA WHST.6–8.10	91–98
CCSS Math 6.NS.C.5	49

MODULE: The Water Cycle

MS-ESS2	Earth's Systems	
MS-ESS2-4.	**Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.** [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [*Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.*]	137–140, 141
SEP Science and Engineering Practices		
Developing and Using Models* Modeling in 6–8 builds on K–5 experiences 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. (MS-ESS2-4) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		108, 111, 113, 116, 118, 131, 137–140, 141
DCI Disciplinary Core Ideas		
ESS2.C: The Roles of Water in Earth's Surface Processes • Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4)		108, *109–110*, 111–113, *114–115,* 116–120, 126, *126,* 127–128, *128–129,* 131–133, *133,* 133A–133B, 134–136, 137–140, 141
• Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)		*109–110*, 111–113, *114–115,* 116–119, 126, *126,* 127–128, *128–129,* 131–133, *133,* 134–135, 137–140, 141
CCC Crosscutting Concepts		
Energy and Matter • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)		*109–110,* 111–113, *114–115,* 116, 118–119, 126, 135, 137–140, 141

Labs and investigations are in italics.

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ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	141
SEP Developing and Using Models	123, *128–129, 133*
SEP Planning and Carrying Out Investigations	*114–115,* 137–140, 141
SEP Analyzing and Interpreting Data	*109–110, 114–115, 128–129, 133,* 137–140
SEP Constructing Explanations and Designing Solutions	106–107, *109–110, 114–115,* 124–125, *126, 128–129,* 133B, 141
SEP Obtaining, Evaluating, and Communicating Information	127, 130, 137–140
DCI ETS1.B: Developing Possible Solutions	120
DCI LS2.A: Interdependent Relationships in Ecosystems	132
DCI LS2.B: Cycle of Matter and Energy Transfer in Ecosystems	112
DCI PS1.A: Structure and Properties of Matter	111, 116
DCI PS2.B: Types of Interactions	133
DCI PS3.A: Definitions of Energy	Lab *What happens to temperature during a phase change?* (online)
DCI PS3.D: Energy in Chemical Processes	112
DCI PS4.B: Electromagnetic Radiation	117
CCC Cause and Effect	*109–110,* 127, 131
CCC Systems and System Models	108, 119–120
CCC Stability and Change	127
CCSS ELA RST.6–8.1	106–107, 124–125, 127
CCSS ELA RST.6–8.3	*109–110*
CCSS ELA RST.6–8.10	117, 127, 130, 133A–133B
CCSS ELA SL.6.1	101, 127
CCSS ELA SL.8.5	137–140

Labs and investigations are in italics.

MODULE: Weather and Climate

MS-ESS2	Earth's Systems	
MS-ESS2-5.	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** [Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [*Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.*]	*217–221,* 253–258, 259

SEP 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. • Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5)	*217–221,* 253–258, 259

DCI Disciplinary Core Ideas	
ESS2.C: The Roles of Water in Earth's Surface Processes • The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)	*202–203, 204–205, 205–206,* 207, *209–210,* 210, *211–212,* 213, *214–215,* 216, *217–221,* 222, 224–226, *237–239,* 239–240, *241–242,* 243–244, *245–247,* 248, 249A–249B, 250–252, 253–258, 259
ESS2.D: Weather and Climate • Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)	217, *217–221,* 222, 225–226, 253–258

CCC Crosscutting Concepts	
Cause and Effect* • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.	159–160, 168, *176, 178, 182–183, 211–212, 214–215, 217–221,* 224–226, 244, 251–252, 253–258, Lab *Predicting Whale Sightings Based on Upwelling* (online)

Labs and investigations are in italics.

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CCSS ELA/Literacy Connections	
ELA RST.6–8.1	148–149, 172–173, 198–199, 207, 230–231, 244, Literacy Skill Handbook (online)
ELA RST.6–8.9	207, Literacy Skill Handbook (online)
ELA WHST.6–8.8	*202–203,* 207, *217–221,* Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	*215,* Math Skill Handbook (online)
Math 6.NS.C.5	*215,* Math Skill Handbook (online)

MS-ESS2	Earth's Systems	
MS-ESS2-6.	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.** [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] [*Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.*]	253–258, 259
SEP Science and Engineering Practices		
Developing and Using Models* Modeling in 6–8 builds on K–5 experiences 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. (MS-ESS2-6) * Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		151, *152–153, 156–158,* 160, 175, *176, 182–183,* 184, 186, 240, 253–258, 259
DCI Disciplinary Core Ideas		
ESS2.C: The Roles of Water in Earth's Surface Processes • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6)		*182–183,* 184, 186, *190,* 190, 192, 253–258, 259

Labs and investigations are in italics.

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ESS2.D: Weather and Climate • Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6)	*152–153,* 153, *154–155,* 156, *156–158,* 158–160, *161–163,* 163–168, *176,* 177, *177, 178–179,* 179, 181, *187–188,* 189, *190,* 192–194, 202, *202–203, 204–205, 205–206,* 207, *208,* 209, *209–210,* 210, *211–212,* 213, *214–215,* 216, 224–226, *233–234,* 235, *237–239,* 239–240, *241–242,* 243–244, *245–247,* 248, *248,* 249, 250–252, 253–258, 259
• The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)	*154–155,* 156, *156–158, 176,* 189, *190,* 194, *204–205, 205–206,* 226, *233–234,* 235, *241–242,* 243–244, 249, 250–252, 253–258, 259
CCC Crosscutting Concepts	
Systems and System Models • Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6)	*150,* 151, *152–153, 154–155, 156–158,* 166–167, 175, *176,* 179, *180,* 184, *185,* 186, 192–193, *204–205,* 240, 253–258
CCSS ELA/Literacy Connections	
ELA SL.8.5	253–258, Literacy Skill Handbook (online)

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	259
SEP Developing and Using Models	*150, 154–155, 174–175, 180, 185, 204–205*
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