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: **Geologic Time**	Module: **Dynamic Earth**	Module: **Distribution of Earth's Resources**	Module: **Natural Hazards**
MS-ESS1-4	●			
MS-ESS2-1		●		
MS-ESS2-2		●		
MS-ESS2-3		●		
MS-ESS3-1			●	
MS-ESS3-2				●
MS-ETS1-1				●
MS-ETS1-2				●
MS-ETS1-4				●

Correlations by Module to the NGSS

MODULE: Geologic Time

MS-ESS1	Earth's Place in the Universe	
MS-ESS1-4.	**Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.** [Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] *[Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]*	49–52, 53

Labs and investigations are in italics.

MS-ESS2	Earth's Systems	
MS-ESS2-3.	**Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.** [Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).] [*Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.*]	*64–65*, 66, *67–68*, 88, 177–182
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 provide evidence for phenomena. (MS-ESS2-3)		*62*, *64–65*, 66, *67–68*, 73, *82*, *84–85*, *87–89*, *98–101*, *102–103*, *105–106*, *112–113*, *124–125*, *126–127*, *129–132*, *134–135*, *152–153*, *154–155*, *159–161*, *163–164*, *168*, 177–182
Connections to Nature of Science **Scientific Knowledge is Open to Revision in Light of New Evidence** • Science findings are frequently revised and/or reinterpreted based on new evidence. (MS-ESS2-3)		83, 86, 88, 91–92
DCI **Disciplinary Core Ideas**		
ESS1.C: The History of Planet Earth • Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (HS.ESS1.C GBE) (secondary to MS-ESS2-3)		*82*, 83, *84–85*, 86, *86*, 87–88, 90–91
ESS2.B: Plate Tectonics and Large-Scale System Interactions • Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3)		62, *62*, *63*, 64, *64–65*, 65–67, *67–68*, 69–70, 72–73
CCC **Crosscutting Concepts**		
Patterns* • Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. (MS-ESS2-3) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.		*84–85*, 87–89, *129–132*, Lab *Can you guess the age of the glue?* (online), Lab *How old is the Atlantic Ocean?* (online)
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		60–61, 78–79, 83, 90, 96–97, 109, 122–123, 141, 150–151, 167, Literacy Skill Handbook (online)
ELA RST.6–8.7		*80–81*, 87, 90, 116, 144, *170–171*, 177–182, Literacy Skill Handbook (online)

Labs and investigations are in italics.

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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. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS1-4)	8–9, 11, *12–13*, *19–21*, 36, 39, *40*, *44–45*, 49–52, 53
DCI Disciplinary Core Ideas	
ESS1.C: The History of Planet Earth • The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)	11–12, *12–13*, 13, *14–17*, 18, *19–21*, 22, *22*, 23, 24–26, 32, 32–33, 33, *34–35*, 36, 38, 39, *40*, 40–42, *42*, 43, *44–45*, 46–48, 49–52, 53
CCC 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. (MS-ESS1-4)	18, 36, 41–42, *42,* 43, *44–45*, 48, 49–52
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 30–31, 41, 46, Literacy Skill Handbook (online)
ELA WHST.6–8.2	23, 37, 49–52, 53, Literacy Skill Handbook (online)
CCSS Math Connections	
MATH 6.EE.B.6	*44–45,* Math Skill Handbook (online)
MATH 7.EE.B.4	*44–45,* Math Skill Handbook (online)
ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	3, 53
SEP Developing and Using Models	*12–13*, 18, *44–45*
SEP Planning and Carrying Out Investigations	*44–45*, 53
SEP Analyzing and Interpreting Data	11, *14–17*, *19–21*, 25, *32–33*, *34–35,* 36, 47
SEP Using Mathematics and Computational Thinking	*44–45*
SEP Obtaining, Evaluating, and Communicating Information	41, 46, 49–52
Connections to Nature of Science Science Investigations Use a Variety of Methods	23

Labs and investigations are in italics.

Continued from previous page.

DCI LS4.A: Evidence of Common Ancestry and Diversity	19, Lab *What can trace fossils show?* (online), Lab *How is a fossil a clue?* (online)
CCC Cause and Effect	26
CCC Systems and System Models	18
CCC Structure and Function	39
CCC Stability and Change	*10*, 11, *14–17*, *19–21*, 22, 26, *38*, 39
Connections to Nature of Science Science is a Way of Knowing	10–11, 37, *40*, 41
Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems	10–11
Connections to Nature of Science Science is a Human Endeavor	10–11, *22*, 37, *40*, 41
CCSS ELA RST.6–8.2	46
CCSS ELA RST.6–8.3	*12–13*
CCSS ELA RST.6–8.10	23, 37, 41
CCSS ELA WHST.6–8.7	23, 37, 49–52
CCSS ELA SL.8.1	3, 7, 29, 41
CCSS ELA SL.8.5	49–52
CCSS Math MP.4	*44–45*
CCSS Math 6.RP.A.1	*44–45*
CCSS Math 7.RP.A.2	*44–45*

MODULE: Dynamic Earth

MS-ESS2	Earth's Systems	
MS-ESS2-1.	**Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.** [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.] *[Assessment Boundary: Assessment does not include the identification and naming of minerals.]*	*170–171*, 174, 177–182, 183

Labs and investigations are in italics.

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SEP Science and Engineering Practices	
Developing and Using Models 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. • Develop and use a model to describe phenomena. (MS-ESS2-1)	*64–65*, *67–68, 80–81*, *98–101*, 101, *102–103*, *105–106*, *112–113*, *124–125*, *126–127*, *129–132*, *134–135*, *138*, *154–155*, *159–161*, 162, *163–164*, *168*, *170–171*, 174, 177–182, 183
DCI Disciplinary Core Ideas	
ESS2.A: Earth's Materials and Systems • All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1)	*86*, 125, 128, *154–155*, 156, 158, 161–162, 164–166, 169–170, *170–171*, 174–176, 177–182, 183
CCC 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 processes at different scales, including the atomic scale. (MS-ESS2-1)	*64–65*, *67–68*, *70*, 72–74, 88, *102–103*, *107*, 107, *108*, 109, 114–118, 121, 124, *124–125*, 125, *126–127*, *128,* 129, *129–132*, 134, *134–135*, 138–139, 141–146, 156, 158, 162, 165, 169, *170–171*, 172, 174, 176, 177–182, 183
CCSS ELA/Literacy Connections	
ELA SL.8.5	141, 177–182, Lab *What tectonic processes are most responsible for shaping North America?* (online), Literacy Skill Handbook (online)

MS-ESS2	Earth's Systems	
MS-ESS2-2.	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.** [Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]	177–182, 183

Labs and investigations are in italics.

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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. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2)	60–61, *64–65*, *67–68*, 72, 74, 78–79, 88, 96–97, 101, *102–103*, *105–106*, 118, 122–123, *124–125*, *126–127*, *129–132*, 133, 137, 140–144, 150–151, *154–155*, *159–161*, 162, 165, 172–174, 176, 177–182, 183
DCI Disciplinary Core Ideas	
ESS2.A: Earth's Materials and Systems • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)	*63*, 64, 70, 88, 98, *98–101*, 101, *102–103*, 104, *105–106*, 106, *107*, 107–108, *108*, 109–111, 114–118, 127, *128*, 128, *129–132*, *134–135*, 136–138, *138*, *139*, 139–146, 177–182, 183
ESS2.C: The Roles of Water in Earth's Surface Processes • Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)	109, 114–115, 121, *126–127*, 127–128, *128*, 129, *129–132*, 132–133, 138, *138*, 139, *139*, 140–146, 177–182, 183
CCC 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. (MS-ESS2-2)	*64–65*, *67–68*, *84–85*, *98–101*, 101, *102–103*, *105–106*, *112–113*, *124–125*, *126–127*, 129, *129–132*, *134–135*, 137, *138*, 142, *154–155*, *159–161*, *163–164*, *168*, *170–171*, 174, 177–182, 183
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	60–61, 78–79, 83, 90, 96–97, 109, 122–123, 141, 150–151, 167, Literacy Skill Handbook (online)
ELA WHST.6–8.2	92, 101, 118, 141, 143, 177–182, 183, Literacy Skill Handbook (online)
ELA SL.8.5	141, 177–182, Lab *What tectonic processes are most responsible for shaping North America?* (online), Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	87, 91, 117, *129–132*, Math Skill Handbook (online)
Math 6.EE.B.6	87, 91, Math Skill Handbook (online)
Math 7.EE.B.4	87, 91, 117, *129–132*, Math Skill Handbook (online)

Labs and investigations are in italics.

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ELA RST.6–8.9	*67–68*, Lab *Can you guess the age of the glue?* (online), Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	87, 91, 117, *129–132*, Math Skill Handbook (online)
Math 6.EE.B.6	87, 91, Math Skill Handbook (online)
Math 7.EE.B.4	87, 91, 117, *129–132*, Math Skill Handbook (online)

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	183
SEP Planning and Carrying Out Investigations	*80–81*, 183
SEP Using Mathematics and Computational Thinking	87, 91, 117, *129–132*
SEP Engaging in Argument from Evidence	74, 176
SEP Obtaining, Evaluating, and Communicating Information	83, 90, 109, 141, 167, 177–182, 183
Connections to Nature of Science Scientific Investigations Use a Variety of Methods	89, 173
DCI ESS3.C: Human Impacts on Earth Systems	167
DCI LS2.A: Interdependent Relationships in Ecosystems	125
DCI LS4.A: Evidence of Common Ancestry and Diversity	67, 70
DCI PS1.A: Structure and Properties of Matter	153, 156–157
DCI PS1.B: Chemical Reactions	127, 156–158, 161, 169
DCI PS3.B: Conservation of Energy and Energy Transfer	156, 158, 169
DCI PS4.A: Wave Properties	80
CCC Patterns	59, *64–65*, 66, *67–68*, 118
CCC Cause and Effect	*107*, *124–125*, *126–127*, *128*, *129–132*, *134–135*, 144–146, 157, *159–161*, *170–171*

Labs and investigations are in italics.

Continued from previous page.

CCC Systems and System Models	*98–101*, 101, *102–103*, *105–106*, *112–113*, *124–125*, *126–127*, *129–132*, *134–135*, *138*, *154–155*, *159–161*, 162, *163–164*, *168*, *170–171*, 177–182
CCC Energy and Matter	*129–132*, 132–133, 156, 158, 161, 167, 169–174, 177–182
Connections to Nature of Science Science is a Way of Knowing	63–66, 69, 83
Connections to Nature of Science Science is a Human Endeavor	63–66, 69, 70, 83
CCSS ELA RST.6–8.2	90
CCSS ELA RST.6–8.3	*64–65*, *67–68*, *98–101*, *102–103*, *105–106*, *112–113*, *124–125*, *126–127*, *129–132*, *134–135*, *159–161*, *152–153*, *168*
CCSS ELA RST.6–8.10	70, 83, 89, 109, 111, 141, 143, 167, 173
CCSS ELA WHST.6–8.7	70, 83, 111, 141, 143, 173
CCSS ELA WHST.6–8.8	141
CCSS ELA SL.7.1	55, 59, 77, 83, 95, 109, 121, 141, 167

MODULE: Distribution of Earth's Resources

MS-ESS3	Earth and Human Activity	
MS-ESS3-1.	**Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.** [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]	255–260, 261
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. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS3-1)		190–191, 203, 205B, 208, 212–213, 216, 221, 226, 234, 238–239, *240–241*, 255–260, 261

Labs and investigations are in italics.

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DCI Disciplinary Core Ideas	
ESS3.A: Natural Resources • Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)	189, 192, *192–193*, 193, *194–195*, 195, *196–198*, 198, *199–201*, 201–203, *203–205*, 205, 205A–205B, 206–208, 214, *214–215*, 215–218, *219*, 220–222, *223*, 224, *224–225*, 225–226, *227–228*, *229–230*, 230–234, 240, 242, 246–248, 254, 255–260, 261
CCC Crosscutting Concepts	
Cause and Effect* • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1) * Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.	226, *244–245*, 247, *248–249*, 251, 255–260
Connections to Engineering, Technology, and Applications of Science **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-ESS3-1)	189, 192–193, 195, 198, 201–203, 205A–205B, 231, *244–245*, 246, *248–249*, 251, 251A–251B, 255–260
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	190–191, 212–213, 222, 238–239, 251, Literacy Skill Handbook (online)
ELA WHST.6–8.2	234, 254, 255–260, Literacy Skill Handbook (online)
ELA WHST.6–8.9	190–191, 212–213, 222, 238–239, 251, 255–260, Literacy Skill Handbook (online)
CCSS Math Connections	
MATH 6.EE.B.6	Math Skill Handbook (online)
MATH 7.EE.B.4	Math Skill Handbook (online)

Labs and investigations are in italics.

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ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	261
SEP Developing and Using Models	*244–245*
SEP Planning and Carrying Out Investigations	261
SEP Analyzing and Interpreting Data	*194–195*, *199–201*, 207, *240–241*, *242–243*, *246*, *248–249*
SEP Using Mathematics and Computational Thinking	*199–201*, *227–228*
SEP Obtaining, Evaluating, and Communicating Information	251–252, 255–260
Connections to Nature of Science Scientific Investigations Use a Variety of Methods	250
DCI LS1.A: Structure and Function	201
DCI PS1.B: Chemical Reactions	196
DCI PS2.B: Types of Interactions	250
DCI PS3.B: Conservation of Energy and Energy Transfer	196
CCC Patterns	*214*, *248–249*, 255–260
CCC Cause and Effect	205A–205B, 251A–251B
CCC Scale, Proportion, and Quantity	205, 216, 226
CCC Systems and System Models	203
CCC Energy and Matter	196
CCC Stability and Change	205A–205B, 251A–251B
Connections to Nature of Science Science is a Human Endeavor	217
CCSS ELA RST.6–8.2	252
CCSS ELA RST.6–8.3	*240–241*, *244–245*
CCSS ELA RST.6–8.7	*240–241*
CCSS ELA RST.6–8.10	202, 217, 222, 231, 250–251
CCSS ELA WHST.6–8.7	222, 250–251, 255–260
CCSS ELA SL.7.1	185, 213, 222, 231, 237, 251
CCSS ELA SL.8.5	205A–205B, 255–260
CCSS Math MP.4	*199–200*
CCSS Math 6.SP.4	*240–241*

Labs and investigations are in italics.

MODULE: Natural Hazards

MS-ESS3	Earth and Human Activity	
MS-ESS3-2.	**Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.** [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]	355–360, 361

SEP 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. (MS-ESS3-2) *Other aspects of this CCC are integrated throughout this module and are listed in the *Also Integrates* section.	*272–273*, *285–287*, 294, *300–301*, *308–311*, 320, *332–335*, *343*, *348–349*, 355–360

DCI Disciplinary Core Ideas

ESS3.B: Natural Hazards • Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)	*270–271*, 271–272, *272–273*, 282, 283, *285–287*, 287, *288–289*, *289*, 290, *290*, *291*, 291A–291B, 292–293, 300, *300–301*, 301, 303, *306–307*, 308, *308–311*, 311, *312*, 313, *313–314*, 315, *316*, 319, *326*, *327–329*, 329, 332, 335, 339, *340–341*, *343*, 344–345, 347, 347A–347B, *348*, *350*, 353, 355–360

CCC Crosscutting Concepts

Patterns • Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)	*270–271*, *275–278*, *288–289*, 293, *300–301*, *306–307*, *308–311*, *312*, *313–314*, 326, *327–329*, *332–335*, *343*, 355–360

Labs and investigations are in italics.

CCC Structure and Function	*289*, STEM Activity *Earthquake Design Challenge* (online)
CCC Stability and Change	*313–314, 340–341, 343,* 346
Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems	348
Connections to Nature of Science Science is a Human Endeavor	284
CCSS ELA SL.7.1	*263, 267, 279, 302, 346*
CCSS ELA RST.6–8.3	*281–282*
CCSS ELA WHST.6–8.7	*285–287, 291, 306–307, 315, 316, 317, 327–329, 340–341, 344–345, 347A–347B, 350,* STEM Activity *Earthquake Design Challenge* (online)*, Lab Hurricane and Their Effects (online)*
CCSS ELA WHST.6–8.10	*279, 284, 291A–291B, 302, 317, 338, 347A–347B, 351, Scientific Text The Benefits of Hurricanes* (online)

Labs and investigations are in italics.

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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. Thus technology use varies from region to region and over time. (MS-ESS3-2)	*290*, *291*, 291A–291B, 315, *316*, 338, *350*, 355–360
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	268–269, 279, 298–299, 302, 324–325, 355–360, Scientific Text *The Benefits of Hurricanes* (online), Literacy Skill Handbook (online)
ELA RST.6–8.7	284, 318, 348, 352, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	*272–273, 303*, *308–311*, *327–329*, Math Skill Handbook (online)
Math 6.EE.B.6	*308–311*, *327–329*, Math Skill Handbook (online)
Math 7.EE.B.4	*308–311*, *327–329*, Math Skill Handbook (online)

MS-ETS1	Engineering Design	
PERFORMANCE EXPECTATION **MS-ETS1-1.**	**Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.**	355–360
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 CCC are integrated throughout this module and are listed in the *Also Integrates* section.		*291*, 315, 355–360

Labs and investigations are in italics.

Next Generation Science Standards

Continued from previous page.

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)	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)	347A–347B
• 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)	*290*, *291*, 291A–291B, 315, *316*, 338, *350*, 355–360
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	268–269, 279, 298–299, 302, 324–325, 355–360, Scientific Text The Benefits of Hurricanes (online), Literacy Skill Handbook (online)
ELA WHST.6-8.8	291B, 316, 317, 347B, 351, 355–360, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	272–273, 303, 308–311, 327–329, Math Skill Handbook (online)
Math 7.EE.3	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.**	355–360
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 CCC are integrated throughout this module and are listed in the *Also Integrates* section.		291, 355–360

Labs and investigations are in italics.

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)	355–360, Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	268–269, 279, 298–299, 302, 324–325, 355–360, Scientific Text The Benefits of Hurricanes (online), Literacy Skill Handbook (online)
ELA RST.6–8.9	355–360, Literacy Skill Handbook (online)
ELA WHST.6–8.9	291B, 317, 347B, 351, 355–360, Scientific Text The Benefits of Hurricanes (online), Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	355–360 272–273, 303, 308–311, 327–329, Math Skill Handbook (online)
Math 7.EE.3	Math Skill Handbook (online)

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.**	355–360
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 CCC are integrated throughout this module and are listed in the *Also Integrates* section.		281–282, 355–360
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)		355–360, STEM Activity *Earthquake Design Challenge* (online), Science and Engineering Practices Handbook (online)

Labs and investigations are in italics.

Continued from previous page.

• Models of all kinds are important for testing solutions. (MS-ETS1-4)	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	317, 347A–347B, 355–360, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	272–273, 303, 308–311, 327–329, Math Skill Handbook (online)

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	*316,* 361
SEP Developing and Using Models	284, *308–311*
SEP Planning and Carrying Out Investigations	*281–282*
SEP Analyzing and Interpreting Data	*275–278, 288–289,* 293, *313–314*
SEP Using Mathematics and Computational Thinking	*272–273, 303, 308–311, 328–329*
SEP Constructing Explanations and Designing Solutions	268–269, 271, 281–282, 282, 289, 290, 291, 298–299, 306, 308–311, 312, 313–314, 316, 324–325, 331, 332–335, 343, 345, 350
SEP Engaging in Argument from Evidence	*308–311*
SEP Obtaining, Evaluating, and Communicating Information	*279, 291, 302, 344–345, 346, 350, 353*
CCC Cause and Effect	*263, 281–282, 306, 339, 345, 347A–347B*
CCC Scale, Proportion, and Quantity	301
CCC Systems and System Models	305, 339, 341, 344
CCC Energy and Matter	*272–273,* 273–274, 279, 284, *313–314*, 329

Labs and investigations are in italics.