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: **Distribution of Earth's Resources**	Module: **Materials Science**
MS-ESS3-1	●	
MS-PS1-3		●
MS-ETS1-1		●
MS-ETS1-2		●
MS-ETS1-4		●

Correlations by Module to the NGSS

MODULE: **Distribution of Earth's Resources**		
MS-ESS3	**Earth's Place in the Universe**	
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).]	73–78, 79
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)		8–9, 21, 23B, 26, 30–31, 34, 39, 44, 52, 56–57, 58–59, 73–78, 79

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)	7, 10, *10–11,* 11, *12–13,* 13, *14–16,* 16, *17–19,* 19–21, *21–23,* 23, 23A–23B, 24–26, 32, *32–33,* 33–36, *37*, 38–40, *41*, 42, *42–43,* 43–44, *45–46*, *47–48,* 48–52, 58, 60, 64–66, 72, 73–78, 79
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.	44, *62–63,* 65, *66–67,* 69, 73–78
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)	7, 10–11, 13, 16, 19–21, 23A–23B, 49, *62–63,* 64, *66–67,* 69, 69A–69B, 73–78
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 30–31, 40, 56–57, 69, Literacy Skill Handbook (online)
ELA WHST.6–8.2	52, 72, 73–78, Literacy Skill Handbook (online)
ELA WHST.6–8.9	8–9, 30–31, 40, 56–57, 69, 73–78, 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)

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	79
SEP Developing and Using Models	*62–63*
SEP Planning and Carrying Out Investigations	79
SEP Analyzing and Interpreting Data	*12–13, 17–19,* 25, *58–59, 60–61, 64, 66–67*

Labs and investigations are in italics.

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SEP Using Mathematics and Computational Thinking	*17–19, 45–46*
SEP Obtaining, Evaluating, and Communicating Information	69–70, 73–78
Connections to Nature of Science Scientific Investigations Use a Variety of Methods	68
DCI LS1.A: Structure and Function	19
DCI PS1.B: Chemical Reactions	14
DCI PS2.B: Types of Interactions	68
DCI PS3.B: Conservation of Energy and Energy Transfer	14
CCC Patterns	*32, 66–67,* 73–78
CCC Cause and Effect	23A–23B, 69A–69B
CCC Scale, Proportion, and Quantity	23, 34, 44
CCC Systems and System Models	21
CCC Energy and Matter	14
CCC Stability and Change	23A–23B, 69A–69B
Connections to Nature of Science Science is a Human Endeavor	35
CCSS ELA RST.6–8.2	70
CCSS ELA RST.6–8.3	*58–59, 62–63*
CCSS ELA RST.6–8.7	*58–59*
CCSS ELA RST.6–8.10	20, 35, 40, 49, 68–69
CCSS ELA WHST.6–8.7	40, 68–69, 73–78
CCSS ELA SL.7.1	3, 29, 40, 49, 55, 69
CCSS ELA SL.8.5	23A–23B, 73–78
Math MP.4	*17–18*
Math 6.SP.4	*58–59*

Labs and investigations are in italics.

MODULE: Materials Science

MS-PS1	Matter and its Interactions	
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.*]	*118*, 125–130

SEP 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 not supported by evidence. (MS-PS1-3) * = Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.	*91–92,* 97, *116, 117, 118, 121*, 125–130

DCI 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. (MS-PS1-3)	*88–90,* 90, *93–94,* 97, 131
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. (MS-PS1-3)	*93–94*, *95*, 95, 96, *113–114*, 115, 125–130

CCC 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. (MS-PS1-3)	85, *88–90,* 90, *91–92,* 93, 96–97, 99–100, 119, 125–130, 131
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. (MS-PS1-3) *Other aspects of this Connections to Engineering, Technology, and Applications of Science are integrated throughout this module and are listed in the *Also Integrates* section.	*95*, 96–97, 119–120, 125–130

Labs and investigations are in italics.

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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-PS1-3)	*106–107*, 108–109, *109*, 110, *110–111,* 117A-117B, 120, 125–130
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	86–87, 104–105, 117, 119, Literacy Skills Handbook (online)
ELA WHST.6–8.8	*91–92*, 97, *116*, *118*, 121, Literacy Skills 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.**	125–130
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.		125–130
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)		125–130, 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, *91–92*, 103, 108, *109*, 110, *110–111*, 112, 115, 117A-117B, *118,* 122–124, 125–130, 131

Labs and investigations are in italics.

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• 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)	*106–107*, 108–109, *109*, 110, *110–111,* 117A–117B, 120, 125–130
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	86–87, 104–105, 117, 119, Literacy Skills Handbook (online)
ELA WHST.6–8.8	*91–92* , 97, *116* , *118,* 121, Literacy Skills Handbook (online)
CCSS Math Connections	
Math MP.2	99, Math Skill Handbook (online)
Math 7.EE.A.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.**	*106–107,* 125–130
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.		*106–107,* 125–130
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)		125–130, Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		96–97, 104–105, 117, 119, Literacy Skills Handbook (online)
ELA RST.6–8.9		108, Literacy Skills Handbook (online)

Labs and investigations are in italics.

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ELA WHST.6–8.7	*91–92,* Literacy Skills Handbook (online)
ELA WHST.6–8.9	*91–92,* 97, *116, 118,* Literacy Skills Handbook (online)
CCSS Math Connections	
Math MP.2	99

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.**	*106–107,* 125–130
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.		*106–107,* 125–130
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)		*106–107,* 125–130, 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		125–130, Literacy Skills Handbook (online)
CCSS Math Connections		
Math MP.2		99, Math Skill Handbook (online)
Math 7.SP		Math Skill Handbook (online)

Labs and investigations are in italics.

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ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	131
SEP Developing and Using Models	96, 115
SEP Planning and Carrying Out Investigations	*88–90, 93–94, 106–107, 113–114,* 131
SEP Analyzing and Interpreting Data	*88–90,* 99, *106–107*
SEP Constructing Explanations and Designing Solutions	86–*87*, 100, 104–105, 108, *113–114,* 115, 124, 125–130, 131
SEP Engaging in Argument from Evidence	112
SEP Obtaining, Evaluating, and Communicating Information	123, 125–130
DCI ESS3.A: Natural Resources	108, 110
DCI ESS3.C: Human Impacts on Earth Systems	112
DCI LS2.A: Interdependent Relationships in Ecosystems	112
DCI LS4.D: Interdependent Relationships in Ecosystems	112
CCC Patterns	*88–90*
CCC Systems and System Models	115
CCC Energy and Matter	96
CCC Stability and Change	112
Connections to Nature of Science Science is a Human Endeavor	97
Connections to Nature of Science Science Addresses Questions About the Natural and Material World	120
Connections to Science, Technology, Society, and the Environment Interdependence of Science, Engineering, and Technology	120
CCSS ELA RST.6–8.3	*88–90, 93–94, 113–114*
CCSS ELA RST.6–8.6	117
CCSS ELA RST.6–8.7	*91–92,* 97–98, 122
CCSS ELA RST.6–8.8	117
CCSS ELA RST.6–8.10	97, 117, 117A–117B, 119, 121
CCSS ELA WHST.6–8.1	112

Labs and investigations are in italics.

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CCSS ELA WHST.6–8.2	*118*
CCSS ELA WHST.6–8.5	*118*
CCSS ELA WHST.6–8.6	*116, 118*
CCSS ELA SL.7.1	117, 119
CCSS ELA SL.7.4	125–130
CCSS ELA SL.7.5	125–130

Labs and investigations are in italics.