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: **Reproduction of Organisms**
MS-LS1-4	●
MS-LS1-5	●
MS-LS1-8	●
MS-LS3-2	●
MS-ETS1-1	●
MS-ETS1-4	●

Correlations by Module to the NGSS

MODULE: Reproduction of Organisms

MS-LS1	From Molecules to Organisms: Structures and Processes	
MS-LS1-4.	**Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.** [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds; and, creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]	*47–49*, 64, *73–75*
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(s). • Use an oral and written argument 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. (MS-LS1-4)	*47–49*, 64, *73–75*

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 knowledge, 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-LS1-5) *Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.	14, 18, 22, 26, 36, 40, 44–45, *58–61,* 68–69, *77–78*, 78, 83–88, 89
DCI Disciplinary Core Ideas	
LS1.B: Growth and Development of Organisms • Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)	76, *77–78*, 78–79, 83–88, 89, Lab *How does an external stimulus affect the growth of a plant?* (online), Lab *How important is light to the growth of plants?* (online)
CCC Crosscutting Concepts	
Cause and Effect • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-5)	*58–61*, 61–64, 76, *77–78*, 78–81, 83–88, 89
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 30–31, 44–45, *47–49*, 68–69, 76, Literacy Skill Handbook (online)
ELA RST.6–8.2	76, Literacy Skill Handbook (online)
ELA WHST.6–8.2	35B, 50, *58–61,* Literacy Skill Handbook (online)
ELA WHST.6–8.9	*47–49, 58–61,* Literacy Skill Handbook (online)
CCSS Math Connections	
Math 6.SP.A.2	Math Skill Handbook (online)
Math 6.SP.B.4	Math Skill Handbook (online)

Labs and investigations are in italics.

MS-LS1-5.	**Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.** [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [*Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.*]	*58–61, 77–78,* 89
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 knowledge, 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-LS1-5) *Other aspects of this SEP are integrated throughout this module and are listed in the *Also Integrates* section.		14, 18, 22, 26, 36, 40, 44–45, *58–61,* 68–69, *77–78,* 78, 89
DCI Disciplinary Core Ideas		
LS1.B: Growth and Development of Organisms • Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)		76, 77–78, 78, 79, 83–88, 89, Lab *How does an external stimulus affect the growth of a plant?* (online), Lab *How important is light to the growth of plants?* (online)
CCC Crosscutting Concepts		
Cause and Effect • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-5)		*58–61,* 61, 62–64, 76, *77–78, 78, 79, 80–81, 83–88, 89*
CCSS ELA/Literacy Connections		
ELA RST.6–8.1		8–9, 30–31, 44–45, *47–49*, 68–69, 76
ELA RST.6–8.2		76
ELA WHST.6–8.2		35B, 50, *58–61*
ELA WHST.6–8.9		*47–49, 61*
CCSS Math Connections		
Math 6.SP.A.2		Math Skill Handbook (Online)
Math 6.SP.B.4		*73–75, 77–78*

Labs and investigations are in italics.

MS-LS1	From Molecules to Organisms: Structures and Processes	
MS-LS1-8.	**Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.** [*Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.*]	*47–49*, 83–88
SEP Science and Engineering Practices		
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences 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-LS1-8)		*47–49*, 83–88
DCI Disciplinary Core Ideas		
LS1.D: Information Processing • Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)		*47–49*, 50, *52,* 53, 83–88, 89
CCC Crosscutting Concepts		
Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8)		*47–49,* 52–53
CCSS ELA/Literacy Connections		
ELA WHST.6–8.8		35A–35B, *47–49,* 50, *54–56, 58–61,* 83–88

MS-LS3	Heredity: Inheritance and Variation of Traits	
MS-LS3-2.	**Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.** [Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.]	83–88
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-LS3-2)		*16–17, 19–21,* 21–22, 24, 83–88

Labs and investigations are in italics.

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DCI Disciplinary Core Ideas	
LS1.B: Growth and Development of Organisms • Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2)	24–25, 32–34, *34–35*, 35–39, 83–88, 89
LS3.A: Inheritance of Traits • Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)	15, 21, 24–25, *34–35,* 35–37, 83–88
LS3.B: Variation of Traits • In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)	15, *16–17, 19–21,* 21–22, 35, 83–88
CCC Crosscutting Concepts	
Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)	11–12, 21, 25
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 30–31, 44–45, *47–49,* 68–69, 76, Literacy Skill Handbook (online)
ELA RST.6–8.4	14–15, *20–21,* 21, Literacy Skill Handbook (online)
ELA RST.6–8.7	*19–20*, 24, 38, *58–61,* 62, 83–88, Literacy Skill Handbook (online)
ELA SL.8.5	23, 37, 83–88, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.4	18, Math Skill Handbook (online)
Math 6.SP.B.5	*13*, 18, 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.**	*54–57, 73–75*

Labs and investigations are in italics.

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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.	Science and Engineering Practices Handbook (online)
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)	35A–35B
• 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)	Science and Engineering Practices Handbook (online)
CCSS ELA/Literacy Connections	
ELA RST.6–8.1	8–9, 30–31, 44–45, *47–49*, 68–69, 76, Literacy Skill Handbook (online)
ELA WHST.6–8.8	35A–35B, *47–49,* 50, *54–56, 58–61*, 83–88, Literacy Skill Handbook (online)
CCSS Math Connections	
Math MP.2	Math Skill Handbook (online)

Labs and investigations are in italics.

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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.**	*54–57*
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)		Science and Engineering Practices Handbook (online)
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)		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		23, 37, 83–88, Literacy Skill Handbook (online)
CCSS Math Connections		
Math MP.2		Math Skill Handbook (online)
Math 7.SP		Math Skill Handbook (online)

ALSO INTEGRATES:	
SEP Asking Questions and Defining Problems	3, 89
SEP Planning and Carrying Out Investigations	89
SEP Analyzing and Interpreting Data	12, *13,* 14, *16–17*, 18, *20–21,* 21, *54–57, 70–71, 73–75, 77–78,* 78, Lab *How does an external stimulus affect the growth of a plant?* (online), Lab *How important is light to the growth of plants?* (online)

Labs and investigations are in italics.

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SEP Using Mathematics and Computational Thinking	*13,* 18
SEP Constructing Explanations and Designing Solutions	8–9, 12, 14, *16–17,* 21–22, 30–31, *34–35,* 36, 64, 82
SEP Obtaining, Evaluating, and Communicating Information	50, *54–57, 58–61*
DCI LS1.A: Structure and Function	40
CCC Patterns	12, *13, 16–17*
CCC Structure and Function	67, *70–71, 73–75*, 79, 81, 83–88
CCSS ELA RST.6–8.3	*16–17, 34–35, 54–57, 70–71, 73–75*
CCSS ELA WHST.6–8.7	23, 35B, 37, 50, *54–61*
CCSS ELA SL.6.1	76
CCSS ELA SL.6.4	*47–49*

Labs and investigations are in italics.