GRADE K-PS2-1

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-PS2-1

Students who demonstrate understanding can:
Conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
[Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.]
[Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.

FOSS Materials and Motion
IG: pp. 45 and 49
EA: *Performance Assessment*, IG pp. 275-276 (Step 7), IG p. 278 (Step 8), IG p. 280 (Step 15), IG p. 285 (Step 8), IG p. 286-287 (Step 5), IG p. 290 (Step 15), IG p. 295 (Step 11), IG p. 298 (Step 7)
Notebook Entry
IG: p. 280 (Step 15) IG p. 290 (Step 15), p. 299 (Step 11) IG p. 305 (Steps 11-12)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
- With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)

FOSS Materials and Motion
IG: pp. 265, 266, 271, 278, 286, 287, 289, 297, 304, 317
SRB: p. 58
TR: pp. C14-C16, C32-C33

Disciplinary Core Ideas

PS2.A: Forces and Motion
- Pushes and pulls can have different strengths and directions. (K-PS2-1)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1)

FOSS Materials and Motion
IG: pp. 43, 265, 268, 270, 273, 277-280, 296-299, 313, 316
SRB: pp. 47-57

PS2.B: Types of Interactions
- When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

FOSS Materials and Motion
IG: pp. 43, 265, 268, 270, 273, 286-290, 304-305, 313, 316
SRB: pp. 60-68

PS3.C: Relationship Between Energy and Forces
- A bigger push or pull makes things speed up or slow down more quickly. (Secondary to K-PS2-1)

FOSS Materials and Motion
IG: pp. 43, 265, 268, 270, 273, 277-280, 298 (Step 7), 299 (Step 10), 313, 316
SRB: p. 58
DOR: "Roller Coaster Builder"

Crosscutting Concepts

Cause and Effect
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1)

FOSS Trees and Weather
IG: pp. 265, 272, 278, 282, 286, 287, 288, 297, 204, 304, 313, 317
TR: pp. D9-D11, D24-D27

GRADE K-PS2-2

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-PS2-2

Students who demonstrate understanding can:
Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. *
[Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]

FOSS Materials and Motion
IG: pp. 45 and 49
EA: *Performance Assessment***,** IG p. 285 (Step 8)**,** IG p. 289 (Step 12)**,** IG p. 290 (Step 15), IG p. 299 (Step 10)**,** IG p. 295 (Step 11), IG p. 298 (Step 7), IG p. 302 (Step 5), IG p. 304 (Step 5), IG p. 305 (Steps 11-12)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

FOSS Materials and Motion
IG: pp. 271, 278, 285, 295, 297-298, 304, 317
TR: pp. C17-C19, C34-C37

Disciplinary Core Ideas

PS2.A: Forces and Motion

- Pushes and pulls can have different strengths and directions. (K-PS2-2)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-2)

FOSS Materials and Motion
IG: pp. 48-49, 270, 273, 276, 295, 297 (Step 6), 299 (Step 10), 302, 316
SRB: pp. 47-59
DOR: "Roller Coaster Builder"

ET1.A: Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (Secondary to K-PS2-2)

FOSS Materials and Motion
IG: pp. 48-49, 270, 285, 289-290 (Steps 12-13), 316
SRB: pp. 9-12, 66-67

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-2)

FOSS Materials and Motion
IG: pp. 272, 278, 297, 304, 317
TR: pp. D9-D11, D24-D27

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-PS3-1

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-PS3-1

Students who demonstrate understanding can:
Make observations to determine the effect of sunlight on Earth's surface.
[Clarification Statement: Examples of Earth's surface and all that lives and grows.]
[Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]

FOSS Materials and Motion
IG: pp. 45 and 49
EA: *Performance Assessment*, IG p. 256 (Steps 10-12)

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 185 (Step 7), IG p. 188 (Steps 9-11)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1)

FOSS Materials and Motion
IG: pp. 217, 255, 256, 258, 317

FOSS Trees and Weather
IG: pp. 174, 178 (Step 9), 179, 266
TR: pp. C14-C16, C32-C33

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer
- Sunlight warms Earth's surface. (K-PS3-1)

FOSS Materials and Motion
IG: pp. 43, 48-49, 209, 217, 219, 254-256, 259 (Step 24), 316

FOSS Trees and Weather
IG: pp. 39, 44-45, 167, 173, 185 (Step 7), 188, 266
SRB: pp. 20-21, 30-31

Crosscutting Concepts

Cause and Effect
- Events have causes that generate observable patterns. (K-PS3-1)

FOSS Materials and Motion
IG: pp. 218, 255, 317
SRB: pp. 60-67

FOSS Trees and Weather
IG: pp. 174, 187, 266
SRB: pp. 28-31
TR: pp. D9-D11, D24-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K-PS3-2

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-PS3-2

Students who demonstrate understanding can:
Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
[Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

FOSS Materials and Motion
IG: pp. 45 and 49
EA: *Performance Assessment*, IG: p. 253 (Step 9), IG: p. 257 (Steps 17-18), IG: p. 260 (Step 26)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2)

FOSS Materials and Motion
IG: pp. 217, 253, 257, 317
SRB: pp. 9-12
TR: pp. C22-C24, C38-C39

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- Sunlight warms Earth's surface. (K-PS3-2)

FOSS Materials and Motion
IG: pp. 43, 48-49, 209, 212-213, 217, 219, 316

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-PS3-2)

FOSS Materials and Motion
IG: pp. 218, 255, 256 (Steps 9-10), 259, 317
TR: pp. D9-D11, D24-D27

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EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-LS1-1

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-LS1-1

Students who demonstrate understanding can:
Describe patterns, through observation, of what plants and animals (including humans) need to survive.
[Clarification Statement: Examples of patterns could include that animals need to take in food, but plants make food; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]

FOSS Animals Two by Two
IG: pp. 37, 39, 41
EA: *Performance Assessment*, IG p. 87 (Step 6), IG p. 90 (Step 11), IG p. 189 (Step 14)

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 116 (Step 11), IG p. 121 (Step 9)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
▪Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

FOSS Animals Two by Two
IG: pp. 75, 94, 106 (Step 11), 109, 139 (Step 1), 165, 240
SRB: pp. 9, 36, 47-54, 56
DOR: *Seashore Surprise*

FOSS Trees and Weather
IG: pp. 77, 102 (Step 4), 104 (Step 6), 108, 134, 149 (Step 7), 150, 214, 227 (Step 4), 255, 266
SRB: pp. 58-59
TR: pp. C17-C19, C34-C37

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms
- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

FOSS Animals Two by Two
IG: pp. 37, 75, 88 (Step 1), 87, 90, 106 (Step 11), 151, 165, 167, 183, 189, 199, 201, 226, 240
SRB: pp. 5, 22, 38, 65-66, 68

FOSS Trees and Weather
IG: pp. 41, 77, 79, 133, 159 (Step 6), 162, 213, 215, 220 (Step 6), 228 (Step 6), 242 (Step 7), 255, 257 (Step 10)
SRB: pp. 14-19, 50, 53
DOR: "Who Lives Here?"
Summer

Crosscutting Concepts

Patterns
- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)

FOSS Animals Two by Two
IG: pp. 76, 97, 98, 102, 111, 113, 150, 166, 183 (Step 5), 184 (Step 3), 187, 200, 203, 221, 240
SRB: pp. 10-19, 20-26, 37-47, 55-63

FOSS Trees and Weather
IG: pp. 78, 98 (Step 4), 100, 109, 116 (Step 11), 123, 134, 144 (Step 8), 146, 150, 214, 231, 243, 255, 257, 266
SRB: p. 59
TR: pp. D5-D8, D24-D25

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-ESS2-1

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-ESS2-1

Students who demonstrate understanding can:
Use and share observations of local weather conditions to describe patterns over time.
[Clarification Statement: Examples of qualitative observations could include descriptions of the weather (Such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.]
[Assessment Boundary: Assessment of quantitative observations is limited to whole numbers and relative measures such as warmer/cooler.]

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 178 (Step 9), IG pp. 180-181 (Steps 8-9), IG p. 202 (Steps 20-21), IG p. 222 (Step 8)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)

FOSS Trees and Weather
IG: pp. 174, 181, 185 (Step 7), 187, 195, 201, 202, 214, 227, 241, 254, 266
SRB: pp. 32-37
TR: pp. C17-C19, C34-C37

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Weather is the combination of sunlight, wind, precipitation, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)

FOSS Trees and Weather
IG: pp. 39, 44-45, 167, 173, 175, 178 (Step 9), 202 (Steps 20-21), 205, 213, 226, 234, 253, 255, 266
SRB: pp. 38-40, 42-44, 59

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)

FOSS Trees and Weather
IG: pp. 174, 188, 214, 215, 240, 243, 257, 266
SRB: pp. 29 and 59
TR: pp. D5-D8, D24-D25

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-ESS2-2.

Students who demonstrate understanding can:
Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
[Clarification Statement: Examples of plants and animals changing their environment could include beavers building dams, a squirrel digs in the ground to hide its food and tree roots can break concrete. Humans have developed means to heat and/or cool our homes and vehicles to protect ourselves from the elements.]

FOSS Animals Two by Two
IG: pp. 37, 39, 41
EA: *Performance Assessment,* IG p. 87 (Step 6)**,** IG p. 144 (Step 12)**,** IG p. 151 (Steps 22-23)**,** IG p. 183 (Step 5)**,** IG p. 189 (Step 14)

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment***,** IG p. 85 (Step 14), IG p. 91 (Step 16)

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(S).

- Construct an argument with evidence to support a claim. (K-ESS2-2)

FOSS Animals Two by Two
IG: pp. 127, 151, 165, 181 (Step 19), 183 (Step 5), 189, 240

FOSS Trees and Weather
IG: pp. 78, 85 (Step 14), 91, 134, 144, 266
TR: pp. C25-C27, C40-C41

Disciplinary Core Ideas

ESS2.E: Biogeology

- Plants and animals can change their environment. (K-ESS2-2)

FOSS Animals Two by Two
IG: pp. 37, 38-40, 41-42, 75, 87, 126, 144 (Step 12), 151, 165, 167, 176 (Step 7), 189, 228, 240

FOSS Trees and Weather
IG: pp. 41, 42-43, 69, 77, 89 (Step 8), 127, 133, 159, 162 (Step 8), 266
DOR: *Once There Was a Tree*

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. They can make choices that reduce their impacts on the land, water, air, and other living things. (Secondary to K-ESS2-2)

FOSS Materials and Motion
IG: pp. 137, 140 (Step 13), 141 (Step 14), 190 (Step 8), 191 (Step 1), 195, 247 (Step 2), 249 (Step 10)
SRB: pp. 41-46
DOR: *What is Agriculture?*
"Recycling Center"

Crosscutting Concepts

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS2-2)

FOSS Animals Two by Two
IG: pp. 76, 85, 128, 166, 176 (Step 7), 228, 230, 266

FOSS Trees and Weather
IG: pp. 78, 85 (Step 14), 94, 98 (Step 4)
TR: pp. D14-D15, D28-D29

IG: Investigations Guide • TR: Teacher Resources • SRB**:** Student *Science Resources* Book • DOR**:** Digital-Only Resources
EA: Embedded Assessment • BM**:** Benchmark Assessment • IA**:** Interim Assessment

GRADE K-ESS3-1

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-ESS3-1

Students who demonstrate understanding can:
Represent the relationship between the needs of different plants or animals (including humans) and the places they live using a model. *[Clarification Statement: Examples of relationships could include that deer eat buds, leaves and grains, therefore, they may live in wooded areas and prairies. Grasses need sunlight, so they often grow in meadows. Plants, animals, and their surroundings make up a system. Models could be drawings, dioramas, and/or use of technology (e.g. iPad app: Drawn and Tell).]*

FOSS Animals Two by Two
IG: pp. 37, 39, 41
EA: *Performance Assessment*, IG p. 92 (Step 4), IG p. 95 (Step 8), IG p. 97 (Step 5), IG p. 103 (Step 14), IG p. 176 (Step 7), IG p. 180 (Step 18)

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 107 (Step 8), IG p. 116 (Step 11), IG p. 121 (Step 9), IG p. 240 (Step 5), IG p. 243 (Step 8)

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent concrete events or design solutions.

- Use a model to represent relationships in the natural world. (K-ESS3-1)

FOSS Animals Two by Two
IG: pp. 75, 92 (Step 4), 165, 176 (Step 7), 181 (Step 19), 240, 266

FOSS Trees and Weather
IG: pp.78, 94, 98 (Step 4)
TR: pp. C11-C13, C30-C31

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

FOSS Animals Two by Two
IG: pp. 37, 38-39, 40-41, 74, 77, 126, 129, 151, 164, 167, 176 (Step 7), 178, 183 (Step 5), 227, 240
SRB: pp. 19, 38, 65

FOSS Trees and Weather
IG: pp. 77, 79, 107 (Step 8), 116 (Step 11), 123, 213, 240, 255, 266
SRB: pp. 4-12, 14-19

Crosscutting Concepts

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS3-1)

FOSS Animals Two by Two
IG: pp. 75, 92 (Step 4), 106 (Step 11), 109, 128, 166, 172, 179, 240

FOSS Trees and Weather
IG: pp. 78, 100, 103, 266
TR: pp. D14-D15, D28-D29

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-ESS3-2

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-ESS3-2

Students who demonstrate understanding can:
Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, weather.
[Clarification Statement: Emphasis is on ways to prepare (e.g. shelter, clothing, food) for all types of weather (e.g. local seasonal weather: tornado sirens, blizzard warnings).]

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 198 (Step 10), IG p. 200 (Step 14), IG p. 202 (Steps 20-21)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.
- Ask questions based on observations to find more information about the designed world. (K-ESS3-2)

FOSS Trees and Weather
IG: pp. 179, 199 (Step 12), 266
SRB: pp. 33-37
TR: pp. C7-C10, C30-C31

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.
- Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)

FOSS Trees and Weather
IG: pp. 174, 182, 198
SRB: pp. 44-45
TR: pp. C28-C29, C40-C41

Disciplinary Core Ideas

ESS3.B: Natural Hazards
- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)

FOSS Trees and Weather
IG: pp. 44-45, 167, 173, 200 (Steps 13-14), 202 (Step 20), 266
SRB: pp. 42-44
DOR: Come a Tide

ETS1.A: Defining and Delimiting an Engineering Problem
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (Secondary to K-ESS3-2)

FOSS Trees and Weather
IG: pp. 44-45, 173, 200 (Steps 13-14)

Crosscutting Concepts

Cause and Effect
- Events have causes that generate observable patterns. (K-ESS3-2)

FOSS Trees and Weather
IG: pp. 188, 195, 266
SRB: pp. 39-40
TR: pp. D9-D11, D24-D27

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-ESS3-3

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K-ESS3-3

Students who demonstrate understanding can:
Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. *[Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include planting trees, reusing paper, and recycling cans and bottles.]*

FOSS Materials and Motion
IG: pp. 45, 49
EA: *Performance Assessment*, IG p. 93 (Step 17), IG p. 103 (Step 23), IG p. 137 (Step 7) IG p. 141 (Steps 15-16), IG p. 171 (Step 13), IG p. 190 (Step 8), IG p. 195 (Step 11), IG p. 250 (Step 14)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

FOSS Materials and Motion
IG: pp. 86, 162, 212-213, 218, 248-249, 317
SRB: pp. 41-46
TR: pp. C28-C29, C40-C41

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. They can make choices that reduce their impacts on the land, water, air, and other living things for sustainability. (K-ESS3-3)

FOSS Materials and Motion
IG: pp. 93, 97, 137, 141 (Step 14), 167, 190, 239, 246, 247-248, 249-250 (Step 10), 316
SRB: pp. 41 and 45
DOR: What is Agriculture?
Environmental Health

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (Secondary to K-ESS3-3)

FOSS Materials and Motion
IG: pp. 31, 46-47, 48-49, 85, 143, 161, 195, 198, 249 (Step 10), 250 (Step 14), 316
DOR: "Recycling Center"

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-ESS3-3)

FOSS Materials and Motion
IG: pp. 86, 137, 162, 201, 218, 317
SRB: p. 46
TR: pp. D9-D11, D24-D27

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K-2-ETS1-1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-1

Students who demonstrate understanding can:
Ask questions, make observations, and gather information to define a simple problem (a situation people want to change) that can be solved through the development of a new or improved object or tool.

FOSS Materials and Motion
IG: pp. 45, 47, 49
EA: *Performance Assessment*, IG p. 143 (Step 6), IG p. 147 (Step 12), IG p. 175 (Step 6), IG p. 176 (Steps 1 and 5)

Science and Engineering Practices	Disciplinary Core Ideas	
Asking Questions and Defining Problems Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions. • Ask questions based on observations to find information about the natural and/or designed world(s). (K–2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K–2-ETS1-1) ***FOSS Materials and Motion*** **IG:** pp. 85, 162, 175, 177, 191, 217, 247 (Step 2), 259 (Step 24), 271, 317 **SRB:** p. 9 **TR:** pp. C7-C10, C30-C31	**ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K–2-ETS1-1) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K–2-ETS1-1) • Before beginning to design a solution, it is important to clearly understand the problem. (K–2-ETS1-1) ***FOSS Materials and Motion*** **IG:** pp. 85, 161, 175, 217, 219, 250 (Step 14), 253 (Step 9), 257, 270, 285, 289 (Step 11), 316 **SRB:** pp. 9-12, 41-42	

IG: Investigations Guide • TR: Teacher Resources • SRB: Student *Science Resources* Book • DOR: Digital-Only Resources
EA: Embedded Assessment • BM: Benchmark Assessment • IA: Interim Assessment

GRADE K–2-ETS1-2

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-2

Students who demonstrate understanding can:
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

FOSS Materials and Motion
IG: pp. 45, 47, 49
EA: *Performance Assessment*, IG p. 198 (Step 8), IG p. 200 (Steps 5-6), IG p. 201 (Step 11), IG p. 202 (Step 14), IG p. 253 (Step 9), IG p. 257 (Step 13)

FOSS Trees and Weather
IG: pp. 41, 43, 45
EA: *Performance Assessment*, IG p. 193 (Step 13), IG p. 197 (Step 8)

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K–2-ETS1-2)

FOSS Materials and Motion
IG: pp. 85, 144, 162, 190, 194, 202 (Step 13), 217, 228, 230, 260 (Step 26), 290 (Step 15), 317

FOSS Trees and Weather
IG: pp. 197 and 266
TR: pp. C11-C13, C30-C31

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K–2-ETS1-2)

FOSS Materials and Motion
IG: pp. 46-47, 48-49, 85, 114 (Step 7), 119, 130, 147 (Step 12), 161,198, 217, 253 (Step 9), 270, 285, 316

FOSS Trees and Weather
IG: pp. 173, 193 (Step 13), 197, 266
SRB: p. 40

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K–2-ETS1-2)

FOSS Materials and Motion
IG: pp. 86, 139, 141 (Step 14), 145, 162, 167 (Step 10), 201, 218, 231, 239 (Step 6), 241, 317
SRB: pp. 19-31, 32-40

FOSS Trees and Weather
IG: pp. 197 and 266
SRB: p. 40
TR: pp. D18-D19, D30-D31

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GRADE K–2-ETS1-3

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-3

Students who demonstrate understanding can:
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

FOSS Materials and Motion
IG: pp. 45, 49
EA: *Performance Assessment,* IG p. 253 (Step 9), IG p. 259 (Steps 23-24), IG p. 260 (Step 26)

Science and Engineering Practices	Disciplinary Core Ideas	
Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Analyze data from tests of an object or tool to determine if it works as intended. (K–2-ETS1-3) ***FOSS Materials and Motion*** **IG:** pp. 217, 222 (Step 8), 240 (Step 5), 256, 317 ***FOSS Trees and Weather*** **IG:** pp. 197 and 266 **TR:** pp. C17-C19, C34-C37	**ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K–2-ETS1-3) ***FOSS Materials and Motion*** **IG:** pp. 217, 253 (Step 9), 316 **SRB:** pp. 10-11	

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GRADE 1-PS4-1

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-PS4-1

Students who demonstrate understanding can:
Plan and conduct investigations to provide evidence that sound can make materials vibrate and that vibrating materials can make sound. *[Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork]*

FOSS Sound and Light
IG: pp. 47, 49
EA: *Notebook Entry,* IG p. 97 (Step 18)**,** IG p. 111 (Step 25), IG p. 156 (Step 14,) IG p. 164 (Step 15)
EA: *Performance Assessment,* IG p. 106 (Step 10), IG p. 137 (Step 10), IG p. 164 (Step 11)
BM: pp. 2-3 (Items 1-2)**,** pp. 4-5 (Item 3)**,** pp. 6-7 (Item 4)**,** pp. 8-9 (Item 1)**,** pp. 10-11 (Item 3)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1)

FOSS Sound and Light
IG: pp. 81, 91, 95, 105, 106, 115, 129, 136, 153
SRB: pp. 7, 32
TR: pp. C14-C17, C36-C39

Disciplinary Core Ideas

PS4.A: Wave Properties

- Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)

FOSS Sound and Light
IG: *pp.80, 92 (Step 6), 93, 97, 106 (Step 11), 109 (Step 21), 128, 131, 154 (Step 9), 155 (Step 11)*
SRB: *pp. 6, 9, 25*
DOR: *All about Sound*

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1)

FOSS Sound and Light
IG: pp. 82, 92, 95, 106, 109, 130, 137
TR: pp. D6-D9, D10-D12

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GRADE 1-PS4-2

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-PS4-2

Students who demonstrate understanding can:
Construct an evidence-based account, through observation, that objects in darkness can be seen only when illuminated.
[Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

FOSS Sound and Light
IG: pp. 47, 51
EA: *Notebook Entry***,** IG p. 240 (Step 17)
EA: *Performance Assessment*, IG p. 236 (Step 10), IG p. 240 (Step 18)
BM: pp. 22-23 (Item 4)**,** pp. 26-27 (Item 2)**,** pp. 28-29 (Item 5)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)

FOSS Sound and Light
IG: pp. 213, 236, 239-240
SRB: p. 60
TR: pp. C23-C26, C44-C45

Disciplinary Core Ideas

PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2

FOSS Sound and Light
IG: *pp. 50. 50-51, 213, 215, 236-237 (Step 10), 234, 240 (Step 16), 246, 248, 254 (Step 2)*
SRB: *p. 57*
DOR: *Light and Darkness*

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-2),

FOSS Sound and Light
IG: pp. 214, 236, 244
TR: pp. D6-D9, D10-D12

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EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 1-PS4-3

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-PS4-3

Students who demonstrate understanding can:
Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
[Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
[Assessment Boundary: Assessment does not include the speed of light.]

FOSS Sound and Light
IG: pp. 47, 51
EA: *Notebook Entry*, IG p. 182 (Step 14), IG p. 183 (Step 15), IG p. 200 (Step 14)
EA: *Performance Assessment*, IG p. 188 (Step 8)
BM: pp. 16-17 (Item 1), pp. 18-19 (Item 2), pp. 20-21 (Item 3), pp. 24-25 (Item 1), pp. 28-29 (Item 5)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct investigations collaboratively to produce data to produce evidence to answer a question. (1-PS4-3)

FOSS Sound and Light
IG: pp. 175, 181, 186, 188, 198, 213, 220, 222, 227
SRB: pp. 44-45
TR: pp. C14-C17, C36-C39

Disciplinary Core Ideas

PS4.B: Electromagnetic Radiation

- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)

FOSS Sound and Light
IG: pp. 30, 46-47, 50-51, 175, 177, 182 (Step 13), 189 (Step 13), 191 (Steps 17-18), 192 (Step 18), 199 (Steps 11 and 13), 208
SRB: p. 43
DOR: Light and Shadows
All about Light My Shadow

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-3)

FOSS Sound and Light
IG: pp. 176, 181, 188, 196, 214, 220, 221, 222, 230,
SRB: pp. 41, 42
TR: pp. D6-D9, D10-D12

GRADE 1-PS4-4

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-PS4-4

Students who demonstrate understanding can:
Design and build a device that uses light or sound to solve the problem of communicating over a distance.
[Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats to build understanding of how sound travels.]
[Assessment Boundary: Assessment does not include technological details for how communication devices work.]

FOSS Sound and Light
IG: pp. 47, 49, 51
EA: *Notebook Entry*, IG p. 164 (Step 15), IG p. 247 (Step 19)
EA: *Performance Assessment*, IG p. 164 (Step 11), IG p. 246 (Step 8)
BM: pp. 28-29 (Item 5); pp. 30-31 (Item 6)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) ***FOSS Sound and Light*** **IG:** pp. 129, 161, 162, 163, 164, 213, 247 **TR:** pp. C23-C26, C44-C45	**PS4.C: Information Technologies and Instrumentation** • People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) ***FOSS Sound and Light*** **IG:** pp. 128,163, 212, 248 (Step 20), 249, 247 (Step 13), **SRB:** pp. 69-75	

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GRADE 1-LS1-1

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-LS1-1

Students who demonstrate understanding can:
Construct an evidence-based argument with the use of a drawing or a model that illustrates how structures of plants or animals help them survive their habitat.
[Clarification Statement: An example could include how the parts of a turtle's body help it survive (e.g. shell protects its body, webbed feet for swimming, claws for climbing.]

FOSS Plants and Animals
IG: pp. 45, 47, 49
EA: *Performance Assessment*, IG p. 215 (Step 17), IG p. 217 (Step 19)
BM: pp. 6-7 (Item 5), pp. 16-17 (Item 4), pp. 18-19 (Item 2)

Science and Engineering Practices

Developing and Using Models
- Develop a simple model based on evidence.

FOSS Plants and Animals
IG: pp. 110 (step 13)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

FOSS Plants and Animals
IG: pp. 102 (step 15), 111 (step 14), 112 (step 16), 145 (step 17), 196 (step 23 and 24), 203 (step 6), 204 (step 9), 244 (step 11), 245 (step 18), 255 (step 18)
SRB: pp. 34, 56, 57, 58, 59, 61, 62, 63, 69

Engaging in argument from evidence
- Construct an argument with evidence to support a claim.

Disciplinary Core Ideas

LS1.A: Structure and Function
- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

FOSS Plants and Animals
IG: pp. 98 (Step 2), 111 (Step 14), 116 (Step 25), 134, 142 (Step 6), 172, 206 (Step 13), 216 (Step 18), 244, 245, 246 (Step 20)
SRB: pp. 57-70
DOR: "Animal Structure Sort"
"Watch it Grow"

LS1.D: Information Processing
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

FOSS Plants and Animals
IG: pp. 172, 175, 206 (Step 13), 216 (Step 18)
DOR: *Animal Growth*
"Animal Structure Sort"

FOSS Sound and Light
SRB: pp. 15-23, 60-68

Crosscutting Concepts

Structure and Function
- The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

FOSS Plants and Animals
IG: pp. 98, 102, 110, 136, 145, 174, 206, 216
TR: pp. D19-D21, D30-D31

Patterns
- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-1)

FOSS Plants and Animals
IG: pp. 111 (step 15), 112 (step 16), 122 (step 10), 153 (step 18), 247 (step 21),

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GRADE 1-LS1-2

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-LS1-2

Students who demonstrate understanding can:
Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
[Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

FOSS Plants and Animals
IG: pp. 45, 49
EA: *Notebook Entry*, IG p. 255 (Step 19)
EA: *Performance Assessment,* IG p. 254 (Step 16)
BM: pp. 21-22 (Item 4)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)

FOSS Plants and Animals
IG: pp. 229, 254 (Step 16), 255
SRB: pp. 71-84
DOR: *Animal Offspring and Caring for Animals*
TR: pp. C32-C33, C46-C47

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

FOSS Plants and Animals
***IG:** pp. 213 (Step 12), 214, 228, 231, 255 (Step 21), 256*
***DOR:** "Find the Parent"*
Animal Offspring and Caring for Animals

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)

FOSS Plants and Animals
IG: pp. 230, 253 (Step 14), 255 (Steps 20 and 21)
TR: pp. D6-D9, D26-D27

GRADE 1-LS3-1

Heredity: Inheritance and Variation of Traits

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-LS3-1

Students who demonstrate understanding can:
Construct an evidence-based account, through observation, that young plants and animals are alike, but not exactly like, their parents.
[Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and a particular breed of dog looks like its parents but is not exactly the same.]
[Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

FOSS Plants and Animals
IG: pp. 45, 47, 49
EA: *Notebook Entry***,** IG p. 124 (Step 16)
EA: *Performance Assessment***,** IG p. 122 (Step 10), IG p. 125 (Step 17), IG p. 245 (Steps 17-18)
BM: pp. 4-5 (Items 3-4)**,** pp. 8-9 (Item 2)**,** pp. 10-11 (Item 3)**,** pp. 14-15 (Item 3)**,** pp. 20-21 (Item 3)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1)

FOSS Plants and Animals
IG: pp. 122 (Step 10), 124 (Step 15), 245, 253, 255 (Step 21)
SRB: pp. 23-25
DOR: Find the Parent
TR: pp. C23-C26, C44-C45

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)

FOSS Plants and Animals
IG: pp. 228, 245 (Step 18), 247, 255, (Step 20)
DOR: Animal Offspring and Caring for Animals

LS3.B: Variation of Traits

- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

FOSS Plants and Animals
IG: pp. 76, 122, 123, 124, 125 (Step 17), 229, 252 (Step 8), 253 (Step 14)
SRB: pp. 20, 21, 22, 26
DOR: Animal Growth

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1)

FOSS Plants and Animals
IG: pp. 78, 122, 230, 252 (Step 8), 253 (Step 14)
TR: pp. D6-D9, D26-D27

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GRADE 1-ESS1-1

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-ESS1-1

Students who demonstrate understanding can:
Describe patterns that can be predicted through observations of the sun, moon, and stars.
[Clarification Statement: Examples are the sun and moon rising in different parts of the sky, and that stars other than our sun are visible at night, but not during the day. This could be investigated using iPad apps.]
[Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

FOSS Air and Weather
IG: pp. 49, 51, 53
EA: *Notebook Entry*, IG p. 183 (Step 16*)*, IG p. 185 (Step 20), IG p. 251 (Step 11)
EA: *Performance Assessment,* IG p. 183 (Step 14), IG p. 250 (Steps 10 and 12)
BM: pp. 11-12 (Item 2), pp. 13-14 (Item 3), pp. 24-25 (Item 2), pp. 26-27 (Item 3)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

FOSS Air and Weather
IG: pp. 143, 183, 243, 249, 250
SRB: p. 37
TR: pp. C18-C20, C40-C43

Disciplinary Core Ideas

ESS1.A: The Universe and its Stars

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

FOSS Air and Weather
***IG:** pp. 135, 142, 145,161 (Step 17), 179 (Step 3), 180, 181, 182 (Step 13), 184, 185 (Step 19), 245, 251, 257*
***SRB:** pp. 26-28, 33-36*

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1)

FOSS Air and Weather
IG: pp. 144, 161 (Step 17), 183, 184 (Step 17), 185, 244, 249, 251
SRB: pp. 30, 37
TR: pp. D6-D9, D26-D27

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GRADE 1-ESS1-2

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 1-ESS1-2

Students who demonstrate understanding can:
Make observations at different times of year to relate the amount of daylight to the time of year.
[Clarification Statement: Emphasis is comparing the amount of daylight in different seasons due to the tilt of the Earth's axis.]
[Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

FOSS Air and Weather
IG: pp. 49, 51, 53
EA: *Notebook Entry***,** IG p. 256 (Step 10)
EA: *Performance Assessment,* IG p. 256 (Step 6), IG p. 266 (Step 13)
BM: pp. 26-27 (Item 4)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

FOSS Air and Weather
IG: pp. 243, 255 (Step 5), 256 (Steps 7 and 8)
TR: pp. C14-C17, C36-C39

Disciplinary Core Ideas

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

FOSS Air and Weather
IG: pp. 242, 245, 255, 257, 264 (Step 10), 265, 266
SRB: pp. 55-58

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-2)

FOSS Air and Weather
IG: pp. 244, 255, 263, 264 (Step 10), 265, 266 (Step 13)
TR: pp. D6-D9, D26-D27

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GRADE K-2-ET1-1

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-1

Students who demonstrate understanding can:
Ask questions, make observations, and gather information to define a simple problem (a situation people want to change) that can be solved through the development of a new or improved object or tool. *[Clarification Statement: For example, students are challenged to create a structure that will protect them from the effects of the sun on the playground; students are challenged to create a house that will have sun exposure throughout the day.]*

FOSS Sound and Light
IG: pp. 49, 51

EA: *Notebook Entry*, IG p. 164 (Step 15), IG p. 247 (Step 19)
EA: *Performance Assessment*, IG p. 164 (Step 11), IG p. 246 (Step 8)

FOSS Air and Weather
IG: p. 51
EA: *Notebook Entry,* IG p. 109 (Step 27)
EA: *Performance Assessment,* IG p. 108 (Step 23), IG p. 109 (Step 25)
BM: pp. 8-9 (Item 6)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K–2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool.

FOSS Sound and Light
IG: pp. 129, 161, 164, 213, 246, 247 (Step 13)
SRB: pp. 70-73

FOSS Air and Weather
IG: pp. 84, 100, 101, 109
SRB: p. 6
TR: pp. C7-C10, C34-C35

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K–2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K–2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K–2-ETS1-1)

FOSS Sound and Light
IG: pp. 160 (Step 4), 163 (Steps 8-9), 164 (Steps 11-13), 165, 243 (Step 5), 245 (Step 5), 246 (Step 1), 249 (Step 22)
SRB: p. 76

FOSS Air and Weather
IG: pp. 84, 100, (Step 3), 101 (Step 5), 104, 109
DOR: Friction and Air Resistance

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K-2-ET1-2

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-2

Students who demonstrate understanding can:
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. *[Clarification Statement: Draw or create a model that will show how a shape of an object helps it function (e.g. how a tree's roots anchor it to the ground).]*

FOSS Sound and Light
IG: pp. 49, 51
EA: *Notebook Entry*, IG p. 164 (Step 12) IG p. 247 (Step 15)
EA: *Performance Assessment,* IG p. 164 (Step 11), IG p. 246 (Step 8)

FOSS Air and Weather
IG: p. 51
EA: *Notebook Entry*, IG p. 109 (Step 26)
EA: *Performance Assessment*, IG p. 109 (Steps 24-25)
BM: pp. 8-9 (Item 6)

FOSS Plants and Animals
IG: p. 49
EA: *Notebook Entry*, IG p. 217 (Step 19)
EA: *Performance Assessment*, IG p. 181 (Step 12)
BM: pp. 278-279 (Item 1), pp. 282-283 (Item 4

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K–2-ETS1-2)

FOSS Sound and Light
IG: pp. 93 (Step 9), 110 (Step 22), 139 (Step 18), 161 (Step 2), 162, 163, 245, 246,247 (Step 15)
SRB: pp. 6, 9

FOSS Air and Weather
IG: pp. 84, 105 (Step 17), 109

FOSS Plants and Animals
IG: pp. 173, 181, 217 (Step 19)
TR: pp. C11-C13, C34-C37

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K–2-ETS1-2)

FOSS Sound and Light
IG: pp. 161 (Step 1), 162 (Step 5), 164 (Step 12), 243, 247 (Steps 15 and 19)

FOSS Air and Weather
IG: pp. 50-51, 109
SRB: p. 6

FOSS Plants and Animals
IG: pp. 172, 180 (Step 9), 181, 217

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K–2-ETS1-2)

FOSS Sound and Light
IG: p. 140 (Step 19)

FOSS Air and Weather
IG: pp. 85, 109

FOSS Plants and Animals
IG: pp. 174, 215
TR: pp. D19-D21, D30-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K–2-ET1-3

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-3

Students who demonstrate understanding can:
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. *[Clarification Statement: Students compare results with peers from a previous experiment. Consider using data from the previous experiment using different materials and their transparency. Use data from Performance Standards K-2-ET1-1 and/or K-2-ET1-2.]*

FOSS Sound and Light
IG: pp. 49, 51
EA: *Notebook Entry*, IG p. 164 (Step 15), IG p. 247 (Step 16)
EA: *Performance Assessment,* IG p. 164 (Step 13), IG p. 246 (Step 8)
BM: pp. 30-31 (Item 6)

FOSS Air and Weather
IG: p. 51
EA: *Notebook Entry*, IG p. 109 (Step 27)
EA: *Performance Assessment,* IG p. 109 (Step 25)
BM: pp. 8-9 (Item 6)

Science and Engineering Practices	Disciplinary Core Ideas	
Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Analyze data from tests of an object or tool to determine if it works as needed. (K–2-ETS1-3) ***FOSS Sound and Light*** **IG:** pp. 164 (Step 13), 246, 247 (Step 16), 248 ***FOSS Air and Weather*** **IG:** pp. 84, 105 (Step 16), 109 **TR:** pp. C18-C20, C40-C43	**ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K–2-ETS1-3) ***FOSS Sound and Light*** **IG:** pp. 164 (Step 13), 247 (Step 16) ***FOSS Air and Weather*** **IG:** pp. 83, 101, 102, 108,109	

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-PS1-1

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-PS1-1

Students who demonstrate understanding can:
Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

FOSS Solids and Liquids
IG: pp. 43, 45, 47
EA: *Notebook Entry***,** IG p. 90 (Step 14), IG p. 101 (Step 13), IG p. 157 (Step 18), IG p. 194 (Step 16), IG p. 245 (Step 23), IG p. 252 (Step 13)
EA: *Performance Assessment***,** IG p. 107 (Step 7), IG p. 148 (Step 7), IG p. 205 (Step 7)
BM: p. 2-3 (Item 1)**,** pp. 6-7 (Item 5)**,** pp. 8-9 (Item 1)**,** pp. 10-11 (Item 3)**,** pp. 14-15 (Items 1-2)**,** pp. 16-17 (Item 3)**,** pp. 18-19 (Item 1)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)

FOSS Solids and Liquids
IG: pp. 77, 86, 100, 107, 122, 139, 147, 148, 162, 170, 183, 191, 199, 217, 233, 240, 242
TR: pp. C14-C16, C34-C37

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)

FOSS Solids and Liquids
IG: pp. 94, 101 (Step 11), 108, 109, 123, 128, 147, 155, 156, 183, 193
SRB: pp. 10, 14-19, 31-32, 40-42, 46-47, 49, 50
DOR: *All About the Properties of Matter*
Properties of Materials
Clothing and Building Materials

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

FOSS Solids and Liquids
IG: pp. 78, 107,140, 148, 184, 205, 211
SRB: pp. 44-46, 52-53
TR: pp. D6-D8, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-PS1-2

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-PS1-2

Students who demonstrate understanding can:
Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* *[Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]*

FOSS Solids and Liquids
IG: pp. 43, 45, 47
EA: *Notebook Entry,* IG p. 211 (Step 7)
EA: *Performance Assessment***,** IG: p. 115 (Step 8)**,** IG p. 199 (Step 8)
BM: pp. 4-5 (Item 3)**,** pp. 6-7 (Item 4)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

FOSS Solids and Liquids
IG: pp. 78, 114 (Step 6), 116 (Step 13), 119 (Step 23)
TR: pp. C17-C19, C38-C41

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different properties are suited to different purposes. (2-PS1-2)

FOSS Solids and Liquids
IG: pp. 77, 102 (Step 15), 113 (Step 1), 117 (Step 15), 118, 119 (Step 24), 277 (Step 10)
SRB: pp. 18, 19, 22-25, 26-30
DOR: *Properties of Materials*
Clothing and Building Materials

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

FOSS Solids and Liquids
IG: pp. 114 (Step 7), 116, 117 (Step 15)
TR: pp. D9-D11, D26-D27

GRADE 2-PS1-3

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-PS1-3

Students who demonstrate understanding can:
Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects (Law of Conservation of Mass: matter can be neither created or destroyed, but just changes shape).]

FOSS Solids and Liquids
IG: pp. 43, 45, 47
EA: *Performance Assessment*, IG p. 115 (Step 8), IG p. 118 (Step 21)
BM: pp. 6-7 (Item 4)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) ***FOSS Solids and Liquids*** **IG:** pp. 78, 115, 117 **TR:** pp. C22-C24, C42-C45	**PS1.A: Structure and Properties of Matter** • Different properties are suited to different purposes. (2-PS1-3) • A great variety of objects can be built up from a small set of pieces. (2-PS1-3) ***FOSS Solids and Liquids*** **IG:** pp. 77, 113, 115, 116, 118, 119, 217, **SRB:** pp. 12, 13, 17, 20	**Energy and Matter** • Objects may break into smaller pieces and be put together into larger pieces or change shapes. (2-PS1-3) ***FOSS Solids and Liquids*** **IG:** pp. 102, 103, 114 (Step 7), 234, 266 **TR:** pp. D16-D17, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-PS1-4

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-PS1-4

Students who demonstrate understanding can:
Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
[Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

FOSS Solids and Liquids
IG: pp. 43, 47
EA: *Notebook Entry*, IG p. 245 (Step 23), IG p. 252 (Step 13), IG p. 269 (Step 19)
EA: *Performance Assessment*, IG p. 259 (Step 11)
BM: pp. 20-21 (Item 2), pp. 22-23 (Item 3), pp. 24-25 (Item 4)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s) • Construct an argument with evidence to support a claim. ***FOSS Solids and Liquids*** **IG:** pp. 233, 242-243 (Step 14), 259, 268, 272 (Step 26) **TR:** pp. C25-C29, C44-C45	**PS1.B: Chemical Reactions** • Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4) ***FOSS Solids and Liquids*** **IG:** 227, 233, 235, 242 (Step 12), 243 (Step 15), 266 (Step 8), 267, 268, 269, 270, 271, 272 **SRB:** pp. 62-67, 68-76 **DOR**: *Solids and Liquids Change It!*	**Cause and Effect** • Events have causes that generate observable patterns. (2-PS1-4) ***FOSS Solids and Liquids*** **IG:** pp. 234, 244, 245, 258, 259, 265, 266, 267, 268, 270 **TR:** pp. D9-D11, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-LS2-1

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-LS2-1

Students who demonstrate understanding can:
Plan an investigation to determine if plants need sunlight and water to grow.
[Assessment Boundary: Assessment is limited to testing one variable at a time.]

FOSS Insects and Plants
IG: pp. 45 and 47
EA: *Notebook Entry*, IG p. 146 (Steps 10-11)
EA: *Performance Assessment,* IG p. 153 (Step 6)
BM: pp. 6-7 (Items 2-3), pp. 12-13 (Item 6), pp. 16-17 (Items 4-6), pp. 26-27 (Item 5)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and investigate collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)

FOSS Insects and Plants
IG: pp. 127, 128, 135, 144, 146-147, 152-153, 157, 174
TR: pp. C14-C16, C34-C37

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow. (2-LS2-1)

FOSS Insects and Plants
IG: pp. 100-101 (Step 21), 145, 146 (Step 14), 147 (Step 15), 155-156 (Step 12), 157 (Steps 16 and 17), 173 (Step 2)
SRB: pp. 6-8
DOR: *How Plants Grow*

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (2-LS2-1)

FOSS Insects and Plants
IG: pp. 136, 148, 156, 157, 159
TR: pp. D9-D11, D26-D27

GRADE 2-LS2-2

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-LS2-2

Students who demonstrate understanding can:
Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. *[Clarification Statement: Have various materials available to simulate how animals aid in pollination.]*

FOSS Insects and Plants
IG: pp. 45, 47, 49
EA: *Performance Assessment***,** IG p. 315 (Step 8)**,** IG p. 315 (Step 14, 15)
BM: pp. 10-11 (Item 5)**,** pp. 24-25 (Item 4)

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

FOSS Insects and Plants
IG: pp. 135, 178, 287, 315, 317
TR: pp. C11-C13, C32-C33

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

FOSS Insects and Plants
IG: pp. 157, 158 (Steps 19-22), 165, 177, 178 (Step 21)
SRB: pp. 27-34, 39
DOR: *How Seeds get Here … and There*
What Is Pollination?

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)

FOSS Insects and Plants
IG: pp. 178, 287, 315, 317, 318

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

FOSS Insects and Plants
IG: pp. 84, 85, 158, 162, 163, 165, 168, 175, 177, 178, 190, 288
TR: pp. D18-D20, D30-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-LS4-1

Biological Evolution: Unity and Diversity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-LS4-1

Students who demonstrate understanding can:
Make observations of plants and animals to compare the diversity of life in different habitats
[Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]
[Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

FOSS Insects and Plants
IG: pp. 45, 47, 49
EA: *Notebook Entry*, IG p. 120 (Step 9), IG p. 121 (Step 12) IG p. 306 (Step 11)
EA: *Performance Assessment*, IG p. 107 (Step 5)
BM: pp. 2-3 (Item 2), pp. 4-5 (Items 3-5), pp. 14-15 (Items 1 and 3), pp. 18-19 (Item 1), pp. 20-21 (Item 3), pp. 22-23 (Items 1-2), pp. 24-25 (Item 3)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data, which can be used to make comparisons. (2-LS4-1)

FOSS Insects and Plants
IG: pp. 107, 176, 189, 201, 219, 237, 245, 251, 271, 315
TR: pp. C14-C16, C34-C37

Disciplinary Core Ideas

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)

FOSS Insects and Plants
IG: *pp. 107, 112-115, 176, 205, 218, 255, 256, 264, 270, 300, 318*
SRB: *pp. 18-26, 35-40, 41-45*
DOR: *All About Water Ecosystems*
Bugs
Habitat Gallery
Habitat Havoc
House and Backyard Insects
Where Does It Live?

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
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GRADE 2-ESS1-1

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-ESS1-1

Students who demonstrate understanding can:
Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
[Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

FOSS Pebbles, Sand, and Silt
IG: pp. 45, 47, 49
EA: *Notebook Entry*, IG p. 90 (Step 13)
EA: *Performance Assessment,* IG pp. 97-98 (Step 14)
BM: pp. 4-5 (Item 4), pp. 12-13 (Items 4ab)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-ESS1-1)

FOSS Pebbles, Sand, and Silt
IG: pp. 79, 89, 96, 129, 146, 162, 168, 228, 235, 245, 250, 256
TR: pp. C22-C24, C42-C45

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)

FOSS Pebbles, Sand, and Silt
IG: pp. 88 (Step 8), 89 (Step 9), 90, 97, 110, 144-145, 167 (Step 30), 236
SRB: pp. 7 and 78
DOR: *All About Volcanoes*
All About Land Formations

Crosscutting Concepts

Stability and Change

- Things may change slowly or rapidly. (2-ESS1-1)

FOSS Pebbles, Sand, and Silt
IG: pp. 80, 89, 95, 97, 130, 145, 165, 228, 236
TR: pp. D21-D23, D30-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-ESS2-1

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-ESS2-1

Students who demonstrate understanding can:
Compare and contrast multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
[Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

FOSS Pebbles, Sand, and Silt
IG: pp. 45, 47, 49
EA: *Notebook Entry*, IG p. 259 (Step 7)
BM: pp. 12-13 (Items 4ab), pp. 22-23 (Item 4)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Compare multiple solutions to a problem. (2-ESS2-1) ***FOSS Pebbles, Sand, and Silt*** **IG:** pp. 79, 129, 219, 220, 228, 256, 259 **TR:** pp. C22-C24, C42-C45	**ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. (2-ESS2-1) ***FOSS Pebbles, Sand, and Silt*** **IG:** pp. 95, 110, 144, 145, 163, 166, 165, 168, 256, 259, 260 **SRB:** pp. 3-10, 14-21, 22-23, 24-30, 68-78 **DOR:** *All About Land Formations* **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1) ***FOSS Pebbles, Sand, and Silt*** **IG:** pp. 49, 142, 219, 220, 221, 227, 256 **SRB:** pp. 68-78	**Stability and Change** • Things may change slowly or rapidly. (2-ESS2-1) ***FOSS Pebbles, Sand, and Silt*** **IG:** pp. 2, 3, 45, 49, 80, 81, 89, 95, 97, 97, 110, 123, 125, 130, 131, 144, 145, 163, 165, 166, 168, 220, 221, 227, 228, 229, 240, 256, 259, 260 **TR:** pp. D21-D23, D30-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-ESS2-2

Students who demonstrate understanding can:
Develop a model to represent the shapes and kinds of land and bodies of water in an area.
[Assessment Boundary: Assessment does not include quantitative scaling in models.]

FOSS Pebbles, Sand, and Silt
IG: pp. 45, 47, 49
EA: *Notebook Entry***,** IG p. 259 (Step 7)
BM: pp. 24-25 (Item 6)

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

FOSS Pebbles, Sand, and Silt
IG: pp. 129, 165, 168, 227, 250, 258
TR: pp. C11-C13, C32-C33

Disciplinary Core Ideas

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)

FOSS Pebbles, Sand, and Silt
IG: pp. 47, 49, 227, 229, 250-251, 258, 259
SRB*:* pp. 81-91

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed. (2-ESS2-2)

FOSS Pebbles, Sand, and Silt
IG: pp. 252 (Step 8), 253 (Step 10), 257 (Step 3)
TR: pp. D6-D8, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 2-ESS2-3

Earth's Systems: Processes that Shape the Earth

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 2-ESS2-3

Students who demonstrate understanding can:
Obtain information to identify where water is found on Earth and that it can be solid or liquid. *[Clarification Statement: Multimedia sources (e.g. Google Earth) may be used to obtain the information. Location effects whether water is solid or liquid.]*

FOSS Pebbles, Sand, and Silt
IG: pp. 45, 47, 49
EA: *Notebook Entry*, IG p. 253 (Step 12)
BM: pp. 20-21 (Item 3), pp. 22-23 (Item 5)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

FOSS Pebbles, Sand, and Silt
IG: pp. 228, 251, 252, 256, 258
TR: pp. D30-D31, D44-D47

Disciplinary Core Ideas

ESS2.C: The Roles of Water in Earth's Surface Processes
- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)

FOSS Pebbles, Sand, and Silt
IG: pp. 227, 250, 251, 252, 253
SRB: pp. 50-60, 61-67

Crosscutting Concepts

Patterns
- Patterns in the natural and/or designed world can be observed. (2-ESS2-3)

FOSS Pebbles, Sand, and Silt
IG: pp. 251 (Step 4), 251 (Step 6), 252 (Step 9)
TR: pp. D6-D8, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K-2-ET1-1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-1

Students who demonstrate understanding can:
Ask questions, make observations, and gather information to define a simple problem (a situation people want to change) that can be solved through the development of a new or improved object or tool. *[Clarification Statement: Use the engineering design process.]*

FOSS Insects and Plants
IG: p. 49
EA: *Notebook Entry,* IG p. 204 (Step 18), IG p. 222 (Steps 17-20)
EA: *Performance Assessment*, IG p. 250 (Step 4)

FOSS Pebbles, Sand, and Silt
IG: p. 49
EA: *Notebook Entry*, IG p. 190 (Step 14), IG p. 195 (Step 15), IG p. 257 (Step 4)

FOSS Solids and Liquids
IG: p. 45
EA: *Notebook Entry*, IG p. 116 (Step 13), IG p. 119 (Step 23)
EA: *Performance Assessment*, IG p. 115 (Step 8)
BM: pp. 6-7 (Item 4)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K–2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K–2-ETS1-1)

FOSS Insects and Plants
IG: pp. 189, 201 (Step 4), 203, 221 (Step 13), 299 (Step 1), 304 (Step 3)

FOSS Pebbles, Sand, and Silt
IG: pp. 181, 195, 211, 212, 214, 227, 229, 233, 243

FOSS Solids and Liquids
IG: pp. 114 (Step 5), 117 (Step 16)
TR: pp. C7-C10, C32-C33

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K–2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K–2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K–2-ETS1-1)

FOSS Insects and Plants
IG: pp. 221, 250, 299, 304

FOSS Pebbles, Sand, and Silt
IG: pp. 180, 186-188, 189, 190, 194, 195, 200, 201, 206, 207, 211, 212
SRB: p. 71

FOSS Solids and Liquids
IG: pp. 113, 114, 117
SRB: pp. 21 and 30

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K–2-ET1-2

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-2

Students who demonstrate understanding can:
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. *[Clarification Statement: Use the engineering design process.]*

FOSS Insects and Plants
IG: pp. 47, 49
EA: *Notebook Entry***,** IG p. 317 (Step 15)

FOSS Pebbles, Sand, and Silt
IG: pp. 49
EA: *Notebook Entry***,** IG p. 259 (Step 7)

FOSS Solids and Liquids
IG: pp. 45
EA: *Notebook Entry***,** IG p. 116 (Step 13), IG p. 119 (Step 23)
EA: *Performance Assessment***,** IG p. 115 (Step 8)
BM: pp. 6-7 (Item 4)

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K–2-ETS1-2)

FOSS Insects and Plants
IG: pp. 189, 221, 222, 315, 317

FOSS Pebbles, Sand, and Silt
IG: pp. 143, 173, 227, 258

FOSS Solids and Liquids
IG: pp. 77, 117, 118
TR: pp. C11-C13, C32-C33

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K–2-ETS1-2)

FOSS Insects and Plants
IG: pp. 189, 221, 222, 315, 317

FOSS Pebbles, Sand, and Silt
IG: pp. 174, 175, 214, 227, 233
SRB: pp. 38-39

FOSS Solids and Liquids
IG: pp. 77, 117, 118

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K–2-ETS1-2)

FOSS Insects and Plants
IG: pp. 315 and 317

FOSS Pebbles, Sand, and Silt
IG: pp. 194 (Step 10), 195 (Step 14)
SRB: pp. 34-35

FOSS Solids and Liquids
IG: pp. 78, 115, 116, 117, 119
SRB: pp. 22-25, 26-30
TR: pp. D18-D20, D30-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE K–2-ET1-3

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation K–2-ETS1-3

Students who demonstrate understanding can:
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
[Clarification Statement: Use the engineering design process.]

FOSS Insects and Plants
IG: p. 49
EA: *Performance Assessment*, IG p. 222 (Step 18), IG p. 317 (Step 15)

FOSS Pebbles, Sand, and Silt
IG: p. 49
EA: *Performance Assessment*, IG p. 200 (Step 8)

FOSS Solids and Liquids
IG: pp. 45
EA: *Notebook Entry*, IG p. 116 (Step 13), IG p. 119 (Step 23)
EA: *Performance Assessment,* IG p. 115 (Step 8)
BM: pp. 6-7 (Item 4)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as needed. (K–2-ETS1-3)

FOSS Insects and Plants
IG: p. 317 (Step 15)

FOSS Pebbles, Sand, and Silt
IG: pp.181, 187, 194, 201

FOSS Solids and Liquids
IG: pp. 78, 117 (Step 18),118 (Step 21)
SRB: pp. 22-25, 26-30
TR: pp. C17-C19, C38-C41

Disciplinary Core Ideas

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K–2-ETS1-3)

FOSS Insects and Plants
IG: pp. 188, 222 (Step 18), 317 (Step 15)

FOSS Pebbles, Sand, and Silt
IG: pp. 200, 206, 212
SRB: p. 71

FOSS Solids and Liquids
IG: pp. 113 (Step 1), 116 (Step 13, 15), 117 (Step 18), 118 (Step 21)
SRB: pp. 26-30

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-PS2-1

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-PS2-1

Students who demonstrate understanding can:
Plan and conduct an investigation to prove the effects of balanced and unbalanced forces on the motion of an object. *[Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces.*

FOSS Motion and Matter
IG: pp. 49, 51
EA: *Performance Assessment***,** IG p. 106 (Step 6)
EA: Response Sheet, IG p. 107, SNM No. 3
BM: pp. 4-5 (Item 3)**,** pp. 10-11 (Item 7)**,** pp. 22-23 (Item 3ab)**,** pp. 24-25 (Item 4ab)**,** pp. 30-31 (Item 1abc)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)

FOSS Motion and Matter
IG: pp. 80, 85, 105, 124, 129, 151, 154, 200
SNM: No. 8
TR: pp. C14-C17, C38-C39

Disciplinary Core Ideas

PS2.A: Forces and Motion

- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1)

FOSS Motion and Matter
IG: pp. 79, 81, 83, 84-85, 87, 116 (Step 7), 117-118 (Steps 9-11), 119, 126-128, 129, 131, 166
SRB: pp. 3, 10-15,
DOR: *All about Motion and Balance*

PS2.B: Types of Interactions

- Objects in contact exert forces on each other. (3-PS2-1)

FOSS Motion and Matter
IG: pp. 84-85, 87, 116 (Step 7), 117-118 (Steps 9-11), 119
SRB: pp. 3-7
DOR: *All about Motion and Balance*

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified. (3-PS2-1)

FOSS Motion and Matter
IG: pp. 86, 97, 99, 101, 109, 114, 137, 138, 144, 157, 165
TR: pp. D9-D11, D28-D29

GRADE 3-PS2-2-2

Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-PS2-2

Students who demonstrate understanding can:
Make observations and/or metric measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. *[Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a seesaw.] [Assessment Boundary: Assessment includes observing and/or measuring input motion and predicting and/or measuring output motion of a repeating pattern of motion. Assessment does not include technical terms, such as magnitude, frequency, velocity, momentum, and vector quantity, but the concept that some quantities need both size and direction to be described is developed.]*

FOSS Motion and Matter
IG: pp. 49, 51, 53
EA: *Performance Assessment***,** IG p. 155 (Step 13)
EA: *Notebook Entry***,** IG p. 139 (Step 17)
EA: *Response Sheet,* IG p. 145**,** SNM Nos. 6-7
BM: pp. 4-5 (Item 2)**,** pp. 8-9 (Item 6ab)**,** pp. 32-33 (Item 2)**,** pp. 34-35 (Item 3ab)**,** pp. 36-37 (Item 4ab)**,** pp. 38-39 (Item 5)
IA: *Physical Science Task 1—Swings*

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

FOSS Motion and Matter
IG: pp. 80, 85, 96, 124, 129, 136, 143
TR: pp. C14-C17, C38-C39

Disciplinary Core Ideas

PS2.A: Forces and Motion

- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.

FOSS Motion and Matter
IG: pp. 123, 125, 126-127, 129, 131, 136 (Step 7), 142 (Step 4), 147 (Step 16), 154 (Steps 9-12), 166
SRB: pp. 16-21
DOR: *"Roller Coaster Builder"*

Crosscutting Concepts

Patterns

- Patterns of change can be used to make predictions. (3-PS2-2)

FOSS Motion and Matter
IG: pp. 86, 106 (Step 4d), 143, 145, 146, 151
TR: pp. D5-D8, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-PS2-3

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-PS2-3

Students who demonstrate understanding can:
Ask questions to determine cause and effect relationships of static electricity or magnetic interactions between two objects not in contact with each other. *[Clarification Statement: Examples of static electricity could include the force on hair from an electrically charged balloon, a charged rod and pieces of paper; examples of a magnetic force could include the force between two magnets, the force between an electromagnet and steel paperclips. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students.]*

FOSS Motion and Matter
IG: pp. 49, 51
EA: *Notebook Entry*, IG p. 99 (Step 14)
EA: *Performance Assessment*, IG p. 200 (Step 6)
BM: pp. 2-3 (Item 1abc), pp. 18-19 (Item 1ab), pp. 20-21 (Item 2), pp. 26-27 (Item 5), pp. 28-29 (Item 6)
IA: *Physical Science Task 1—Swings*

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
- Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)

FOSS Motion and Matter
IG: pp. 79, 80, 85, 94, 105, 108
SNM: No. 2
TR: pp. C7-C10, C34-C35

Disciplinary Core Ideas

PS2.B: Types of Interactions
- Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3)

FOSS Motion and Matter
IG: pp. 79, 81, 82, 84, 87, 98-99 (Step 12), 101 (Step 17), 116 (Step 7), 119
SRB: pp. 3-7
SNM: No. 2
DOR: *"Magnetic Poles"*
All about Magnets

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3)

FOSS Motion and Matter
IG: pp. 86, 97, 99, 101, 109, 114
TR: pp. D9-D11, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-PS2-4

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-PS2-4

Students who demonstrate understanding can:
Define a simple design problem that can be solved by applying scientific ideas about magnets. *[Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]*

FOSS Motion and Matter
IG: pp. 49, 51
EA: *Performance Assessment*, IG p. 200 (Step 6)
BM: pp. 28-29 (Item 6)
IA: *Physical Science Task 2—Toy Shed*

Science and Engineering Practices	Disciplinary Core Ideas	
Asking Questions and Defining Problems • Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) ***FOSS Motion and Matter*** **IG:** pp. 172, 175, 176, 177, 199, 209, 211 **SRB:** pp. 42-45 **TR:** pp. C7-C10, C34-C35	**PS2.B: Types of Interactions** • Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-4) ***FOSS Motion and Matter*** **IG:** pp. 176, 177, 210 (Steps 11-12) **SRB:** pp. 42-45	

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-LS1-1

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS1-1

Students who demonstrate understanding can:
Develop models to describe that organisms have unique and diverse life cycles, but all experience birth, growth, reproduction, and death. *[Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]*

FOSS Structures of Life
IG: pp. 47, 49
EA: *Notebook Entry,* IG p. 170 (Step 13)
BM: pp. 6-7 (Item 4ab), 9-10 (Item 6), 16-17 (Item 12)
IA: *Life Science Task 1— Life Cycles*

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop models to describe phenomena. (3-LS1-1)

FOSS Structures of Life
IG: pp. 81, 82, 87, 90, 135, 137, 146, 152, 170
TR: pp. C11-C13, C36-C37

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

FOSS Structures of Life
IG: pp. 82, 83, 84, 86, 88-89, 91, 99, 140, 145, 147, 149 151-152, 153, 169-171 (Steps 9-15), 173 (Steps 21-21), 182
SRB: p. 3-7, 22-25, 26-33, 47-49
DOR: "Life Cycles"
All About Animal Life Cycles

Crosscutting Concepts

Patterns

- Patterns of change can be used to make predictions. (3-LS1-1)

FOSS Structures of Life
IG: pp. 85, 90, 101, 104, 117, 119, 152, 162, 170 (Step 13), 173
TR: pp. D5-D8, D28-D29

GRADE 3-LS2-1

Ecosystems: Interactions, Energy, Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS2-1

Students who demonstrate understanding can:
Construct an argument that some animals form groups that help members survive. *[Clarification Statement: Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.]*

FOSS Structures of Life
IG: pp. 47, 51
EA: Response Sheet IG: p. 257, SNM No. 23
BM: pp. 4-5 (Items 2-3)

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence, data, and/or a model. (3-LS2-1)

FOSS Structures of Life
IG: pp. 188, 202, 244-245, 250, 268 (Step 14), 261
TR: pp. C27-C31, C44-C45

Disciplinary Core Ideas

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. (3-LS2-1)

FOSS Structures of Life
IG: pp. 187, 191, 246 (Step 18), 248-249 (Steps 21-22), 249 (Step 23), 272
SNM: No. 21
DOR: *All About Animal Behavior and Communication*
Humphrey, the Lost Whale: A True Story

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1)

FOSS Structures of Life
IG: pp. 202, 242, 257, 260, 261, 270
TR: pp. D9-D11, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-LS3-1

Heredity: Inheritance and Variation of Traits

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS3-1

Students who demonstrate understanding can:
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
[Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

FOSS Structures of Life
IG: pp. 47, 49, 51
EA: Performance Assessment, IG: p. 309 (Step 10)
BM: pp. 2-3 (Item 1), pp. 18-19 (Item 1ab), pp. 24-25 (Items 5-6)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

FOSS Structures of Life
IG: pp. 146, 152, 158, 169, 280, 291, 301, 309, 320, 336
TR: pp. C18-C20, C40-C41

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents. (3-LS3-1)

FOSS Structures of Life
IG: pp. 145, 147, 149, 151, 182, 272, 279, 281, 293, 309 (Step 9), 341

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)

FOSS Structures of Life
IG: p. 283-284, 272, 283, 309 (Step 9 and 10), 310 (Step 10), 336 (Step 11), 341

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)

FOSS Structures of Life
IG: p. 152, 162, 173, 335 (Step 10)
TR: pp. D5-D8, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-LS3-2

Heredity: Inheritance and Variation of Traits

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS3-2

Students who demonstrate understanding can:
Use evidence to support the explanation that the environment can influence the expression of traits.
[Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted. Environmental exposures may alter an organism's DNA.]

FOSS Structures of Life
IG: pp. 47, 49, 51
EA: Response Sheet**,** IG p. 257**,** SNM No. 23
BM: pp. 8-9 (Item 5ab), pp. 26-27 (Item 1ab)**,** pp. 32-33 (Item 6)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)

FOSS Structures of Life
IG: pp. 188, 190, 202, 230, 238, 244, 268, 270
TR: pp. C23-C31, C42-C43

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)

FOSS Structures of Life
IG: pp. 187, 189, 194-195, 201, 203, 232 (Step 24), 233 (Step 26), 237 (Step 38), 272
DOR: "Walking Stick Survival"

LS3.B: Variation of Traits

- The environment also affects the traits that an organism develops. (3-LS3-2)

FOSS Structures of Life
IG: pp. 187, 189, 194-195, 201, 203, 232 (Step 24), 233 (Step 26), 237 (Step 38), 272
DOR: "Walking Stick Survival"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2)

FOSS Structures of Life
IG: pp. 202, 235 (Step 31), 242, 260, 261, 270
TR: pp. D9-D11, D28-D29

GRADE 3-LS4-1

Biological Evolution: Unity and Diversity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS4-1

Students who demonstrate understanding can:
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. *[Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]*

FOSS Structures of Life
IG: pp. 47, 51
EA: *Reading in Science Resources*, IG p. 311 (Steps 17-18), IG p. 313 (Step 22)
BM: pp. 9-10 (Item 7), pp. 14-15 (Item 9)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)

FOSS Structures of Life
IG: pp. 280, 291, 301, 309, 320, 336
TR: pp. C18-C20, C40-C41

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity
- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1)
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

FOSS Structures of Life
IG: pp. 279, 281, 291, 293, 312 (Steps 20-21), 313 (Steps 22-23), 340-341
SRB: pp. 68-69, 81-88
DOR: All About Fossils

Crosscutting Concepts

Scale, Proportion, and Quantity
- Observable phenomena exist from very short to very long time periods. (3-LS4-1)

FOSS Structures of Life
IG: pp. 292, 310, 312
TR: pp. D12-D13, D30-D31

GRADE 3-LS4-2

Biological Evolution: Unity and Diversity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS4-2

Students who demonstrate understanding can:
Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. *[Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]*

FOSS Structures of Life
IG: pp. 47, 51
EA: Answer the Focus Question**,** IG p. 237 (Step 38)
BM: pp. 12-13 (Item 8ab)
IA: Life Science Task 2—Walking Sticks

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

FOSS Structures of Life
IG: pp. 188, 190, 202, 230, 238, 244, 268, 270
TR: pp. C23-C31, C42-C43

Disciplinary Core Ideas

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

FOSS Structures of Life
IG: pp. 187, 189, 193-194, 201, 233 (Step 27), 272
SNM: Nos. 17-20
DOR: "Walking Stick Survival"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2)

FOSS Structures of Life
IG: pp. 202, 235 (Step 31), 242, 260, 261, 270
TR: pp. D9-D11, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-LS4-3

Biological: Unity and Diversity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-LS4-3

Students who demonstrate understanding can:
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. *[Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]*

FOSS Structures of Life
IG: pp. 47, 51
EA: IG p. 237 (Step 38)
BM: pp. 16-17 (Item 12), pp. 34-35 (Item 1ab), pp. 36-37 (Item 2), pp. 38-39 (Item 4ab), pp. 40-41 (Item 5)
IA: *Life Science Task 2—Walking Sticks*

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence. (3-LS4-3)

FOSS Structures of Life
IG: pp. 188, 190, 202, 244-245, 250
TR: pp. C27-C31, C44-C45

Disciplinary Core Ideas

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

FOSS Structures of Life
IG: pp. 187, 189, 191, 193-194, 201, 203, 247-248 (Steps 19-20), 272
SNM: Nos. 15, 16
SRB: pp. 42-49, 50-63
DOR: All About Animal Adaptations
"Where Does It Live?"
"What Doesn't Belong?"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS4-3)

FOSS Structures of Life
IG: pp. 202, 242
TR: pp. D9-D11, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-ESS2-1

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-ESS2-1

Students who demonstrate understanding can:
Represent data in tables and graphical displays to describe and predict typical weather conditions expected during a particular season.
[Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]

FOSS Water and Climate
IG: pp. 49, 51
EA: *Performance Assessment*, IG p. 212 (Step 13), IG p. 226 (Step 4)
EA: Notebook Entry, IG p. 269 (Step 13)
BM: pp. 14-15 (Item 10), pp. 46-47 (Items 2-3 , pp. 50-51 (Item 7), pp. 56-59 (Items 1ab-2), pp. 60-61 (Item 4)
IA: *Earth Science Task 1—Seasons*

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Represent data in tables and various graphical displays (bar graphs, pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)

FOSS Water and Climate
IG: pp. 192, 194, 201, 212, 213, 227, 228, 233, 253, 254, 259, 266, 267
TR: pp. C18-C20, C40-C41

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)

FOSS Water and Climate
IG: pp. 196, 200, 202-203, 207 (Step 9), 214-215 (Steps 18-19), 256, 259, 261
SRB: pp. 30-36
DOR: *"Weather Grapher"*

Crosscutting Concepts

Patterns

- Patterns of change can be used to make predictions. (3-ESS2-1)

FOSS Water and Climate
IG: pp. 201, 212, 213, 215, 222, 236, 260, 268, 269, 273, 277
TR: pp. D5-D8, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-ESS2-2

Students who demonstrate understanding can:
Obtain and combine information to describe climates in different regions of the world. *[Clarification Statement: Examples of climate in different regions, how climate predicts weather conditions, and climate variations around the world.]*

FOSS Water and Climate
IG: pp. 47, 51
EA: Notebook Entry**,** IG p. 277 (Step 16)
BM: pp. 12-13 (Item 9)**,** pp. 18-19 (Item 12ab)**,** pp. 62-63 (Item 5)**,** pp. 64-65 (Item 7)
IA: *Earth Science Task 2—Climate*

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

- Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)

FOSS Water and Climate
IG: pp. 254, 259, 276, 283, 284
TR: pp. C32-C33, C46-C47

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

FOSS Water and Climate
IG: pp. 253, 255, 256, 257, 259, 261, 272 (Step 1), 275 (Steps 11-12), 276 (Step 13)
SRB: pp. 48-54
DOR: *"Climate Regions Map"*

Crosscutting Concepts

Patterns

- Patterns of change can be used to make predictions. (3-ESS2-2)

FOSS Water and Climate
IG: pp. 260, 268, 269, 273, 277
TR: pp. D5-D8, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3-ESS3-1

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3-ESS3-1

Students who demonstrate understanding can:
Evaluate the feasibility of a design solution that reduces the impacts of a weather-related hazard. *[Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding and wind resistant roofs.]*

FOSS Water and Climate
IG: pp. 47, 51
EA: Notebook Entry**,** IG p. 285 (Step 16)
BM: pp. 58-59 (Item 3)

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1)

FOSS Water and Climate
IG: pp. 292, 299, 319, 325
TR: pp. C27-C31, C44-C45

Disciplinary Core Ideas

ESS3.B: Natural Hazards

- A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)

FOSS Water and Climate
IG: pp. 253, 255, 258, 259, 261, 284-285 (Steps 11-13)
SRB: pp. 55-60, 61-62

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

FOSS Water and Climate
IG: pp. 260, 282, 284, 300, 307, 310
TR: pp. D9-D11, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-1

Students who demonstrate understanding can:
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. *[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart. Design ideas may be quite simple. This could include an object, tool, process, or system either at home or school that may make life easier or more efficient. Identify a problem impacting the student will be the most influential.]*

FOSS Water and Climate
IG: p. 51
EA: *Performance Assessment*, IG p. 325 (Step 8)

FOSS Motion and Matter
IG: p. 53
BM: pp. 12-13 (Item 8ab), pp. 44-47 (Item 2abcd)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3–5-ETS1-1)

FOSS Structures of Life
IG: p.136
FOSS Water and Climate
IG: pp. 325, 327
FOSS Motion and Matter
IG: pp. 172, 175, 176, 177, 199, 200, 209, 211
TR: pp. C7-C10, C34-C35

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3–5-ETS1-1)

FOSS Water and Climate
IG: pp. 281-285, 323-328
SRB: pp. 55-60, 61-62

FOSS Motion and Matter
IG: pp. 171, 173, 177, 179, 212
SRB: pp. 25-27, 28-33, 34-37

Crosscutting Concepts

Influence of Engineering, Technology, and Science on Society and the Natural World

- People's needs and wants change over time, as do their demands for new and improved technologies. (3–5-ETS1-1)

FOSS Water and Climate
IG: p. 329
SRB: pp. 86-89

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1-2

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-2

Students who demonstrate understanding can:
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. *[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart.]*

FOSS Water and Climate
IG: p. 51

FOSS Water and Climate
IG: p. 51
EA: *Performance Assessment*, IG p. 325 (Step 26), IG p. 330 (Step 8)
BM: pp. 2-3 (Item 1), pp. 62-63 (Item 6)

FOSS Motion and Matter
IG: p. 53
EA: *Performance Assessment*, IG p. 184 (Step 11), IG p. 193 (Step 16)
BM: pp. 12-13 (Item 8ab), pp. 44-47 (Item 2abcd)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3–5-ETS1-2)

FOSS Structures of Life
IG: pp. 137, 138

FOSS Water and Climate
IG: p. 328

FOSS Motion and Matter
IG: pp. 172, 178, 184, 193, 200, 202, 209, 211
TR: pp. C23-C31, C42-C43

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3–5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3–5-ETS1-2)

FOSS Structures of Life
IG: pp. 135 (Step 4), 136 (Step 12)
DOR: *How Seed Get Here … and There*

FOSS Water and Climate
***IG:** pp. 324-328*

FOSS Motion and Matter
IG: pp. 171, 173, 177, 179, 212

Crosscutting Concepts

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1-3

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-3

Students who demonstrate understanding can:
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. *[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart.]*

FOSS Water and Climate
IG: p. 51
EA: *Performance Assessment*, IG p. 325 (Step 8)

FOSS Motion and Matter
IG: p. 53
BM: pp. 12-13 (Item 8ab), pp. 40-41 (Item 1), pp. 44-47 (Item 2abcd)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3–5-ETS1-3)

FOSS Motion and Matter
IG: pp. 172, 178, 182, 191, 200, 209

FOSS Water and Climate
IG: pp. 225-227, 314-317
SRB: pp. 39-40

DOR: "Virtual Investigation: Water Retention in Water"

FOSS Structures of Life
IG: pp. 242-245
TR: pp. C14-C17, C38-C39

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3–5-ETS1-3)

FOSS Water and Climate
IG: pp. 291, 292, 299, 301, 325-328

FOSS Motion and Matter
IG: pp. 171, 173, 177, 179, 212

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3–5-ETS1-3)

FOSS Motion and Matter
IG: pp. 171, 173, 177, 179, 212

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-PS3-1

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS3-1

Students who demonstrate understanding can:
Use evidence to construct an explanation relating the speed of an object to the energy of that object.
[Clarification Statement: Emphasis on relative speeds of objects and the connection between motion and energy.] [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object.]

FOSS Energy
IG: pp. 59, 63
EA: *Notebook Entry*, IG p. 304 (Step 15)
EA: *Response Sheet*, IG p. 315, SNM No. 25
BM: pp. 12-13 (Item 8), pp. 54-55 (Items 2ab), pp. 56-57 (Item 3), pp. 62-63 (Item 9)
IA: *Physical Science Task 1—Speed and Energy*

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Use evidence (e.g., observations or patterns) to construct an explanation. (4-PS3-1)

FOSS Energy
IG: pp. 303, 304, 306 (Step 20), 314, 321
TR: pp. C23-C26, C46-C53

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- The faster a given object is moving, the more energy it possesses. (4-PS3-1)

FOSS Energy
IG: pp. 301 (Step 5), 303 (Step 11), 304 (Step 15), 314 (Step 13), 320 (Step 26), 321

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects. (4-PS3-1)

FOSS Energy
IG: pp. 277, 286, 293, 295, 314, 321, 322
TR: pp. D18-D20, D34-D35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-PS3-2

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS3-2

Students who demonstrate understanding can:
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. *[Clarification Statement: Emphasis is on the transfer of energy whenever objects are moving. Examples include how sound, light, and heat can transfer energy.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]*

FOSS Energy
IG: pp. 59, 61, 63
EA: *Performance Assessment*, IG p. 255 (Step 6), IG p. 293 (Step 10)
BM: pp. 8-9 (Item 4), pp. 22-23 (Items 4-5), pp. 24-25 (Item 6), pp. 26-27 (Items 7-8), pp.56- 57 (Item 4), pp. 58-59 (Item 5)pp. 62-63 (Item 9)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

FOSS Energy
IG: pp. 121, 138, 140, 152, 153, 246, 302, 311, 312
TR: pp. C14-C17, C38-C41

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2)

FOSS Energy
IG: pp. 123 (Step 10), 126 (Step 18), 164, 169, 271, 294-295 (Steps 13-15), 321
SRB: pp. 65-73
DOR: "Lighting a Bulb"
"Flow of Electric Current"

PS3.B: Conservation of Energy and Energy Transfer

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light.

FOSS Energy
IG: pp. 127-128 (Steps 19-21), 164, 169, 271, 293, 296 (Step 16), 314 (Step 13), 316 (Steps 17-19), 320 (Step 26), 321, 368-369 (Steps 22-24)
SRB: pp. 3-7, 100-105
DOR: *All About Transfer of Energy*
"Reflecting Light"

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects. (4-PS3-2)

FOSS Energy
IG: pp. 125, 129, 137, 139, 142, 156, 248, 260, 295, 314
TR: pp. D18-D20, D34-D35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-PS3-3

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS3-3

Students who demonstrate understanding can:
Ask questions and predict outcomes about the changes in energy that occur when objects collide.
[Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

FOSS Energy
IG: pp. 59, 63, 65
EA: *Performance Assessment*, IG p. 293 (Step 10)
EA: *Response Sheet,* IG p. 315, SNM No. 25
BM: pp. 2-3 (Items 1ab), pp. 4-5 (Items 2ab), pp. 58-59 (Item 6), pp. 60-61 (Item 7), pp. 62-63 (Item 8)
IA: *Physical Science Task 1—Speed and Energy*

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

FOSS Energy
IG: pp. 285, 315, 338, 381
TR: pp. C7-C10, C34-C35

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

FOSS Energy
IG: pp. 303 (Step 11), 318-319 (Steps 23-25), 321, 384
SRB: pp. 83-85

PS3.B: Conservation of Energy and Energy Transfer

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-3)

FOSS Energy
IG: pp. 293, 314 (Step 13), 316 (Steps 17-19), 321, 384
SRB: p. 78

PS3.C: Relationship Between Energy and Forces

- When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)

FOSS Energy
IG: pp. 305-306 (Steps 17-19), 317-318 (Steps 20-22), 320 (Step 26), 321
SRB: pp. 74-77, 79-82
DOR: *All About Transfer of Energy*

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects. (4-PS3-3)

FOSS Energy
IG: pp. 295, 314, 351, 352, 366
TR: pp. D18-D20, D34-D35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-PS3-4

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS3-4

Students who demonstrate understanding can:
Use the engineering design process to build a device that converts energy from one form to another.
[Clarification Statement: Examples of devices could include a greenhouse model such as a glass jar in direct sunlight, electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater (solar oven) that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device. Use engineering design process flow chart.]

FOSS Energy
IG: pp. 59, 61, 63, 65
EA: *Notebook Entry*, IG p. 126 (Step 17)
EA: *Response Sheet,* IG p. 156**,** SNM No. 7
EA: *Performance Assessment*, IG p. 255 (Step 6)**,** IG p. 293 (Step 10)**,** IG p. 381 (Step 18)
EA: *Review*, IG p. 351 (Step 13)
BM: pp. 2-3 (Items 1ab)**,** pp. 4-5 (Items 2ab), pp. 58-59 (Item 6)**,** pp. 60-61 (Item 7)**,** pp. 62-63 (Item 8)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Apply scientific ideas to solve design problems. (4-PS3-4)

FOSS Energy
IG: pp. 124, 126, 141, 249, 264, 266, 303, 304, 314, 357, 363
TR: pp. C23-C26, C46-C53

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. (4-PS3-4)

FOSS Energy
IG: pp. 127-128 (Steps 19-21), 165 (Step 10), 169, 271, 293, 321, 384
SRB: pp. 3-7
DOR: **"**Conductor Detector"

PS3.D: Energy in Chemical Processes and Everyday Life

- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

FOSS Energy
IG: pp. 120 (Step 2), 169, 271, 321, 384

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects. (4-PS3-4)

FOSS Energy
IG: pp. 125, 129, 137, 139, 142, 156, 248, 260, 295, 314, 352, 366
TR: pp. D18-D20, D34-D35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-PS4-1

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS4-1

Students who demonstrate understanding can:
Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
[Clarification Statement: Examples of models could include diagrams, analogies, and physical models to illustrate wavelength and amplitude of waves (e.g. waves could be modeled using rope, wire, slinky, fabric, water).] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]

FOSS Energy
IG: pp. 59, 65
EA: *Notebook Entry***,** IG p. 352 (Step 18)
BM: pp. 6-7 (Items 3ab)

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1)

FOSS Energy
IG: pp. 338, 347, 361, 365
TR: pp. C11-C13, C34-C37

Disciplinary Core Ideas

PS4.A: Wave Properties

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets the beach. (4-PS4-1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

FOSS Energy
IG: pp. 341, 348-349 (Steps 10-11), 351-352 (Steps 14-16), 353-355 (Steps 19-22), 384
SRB: pp. 86-90
DOR: *All About Waves*

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort, classify and analyze simple rates of change for natural phenomena. (4-PS4-1)

FOSS Energy
IG: pp. 346, 347, 351, 352, 357
TR: pp. D6-D9, D28-D29

GRADE 4-PS4-3

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-PS4-3

Students who demonstrate understanding can:
Construct a code to convey information by researching past and present methods of transmitting information.
[Clarification Statement: Examples of past methods could include a string between two cans, Morse code, rotary dial telephones. Examples of current methods include fiber optics, digitized signals, wireless communication, Bluetooth, and using code.org for exploration of computer coding patterns.]

FOSS Energy
IG: pp. 59, 63
EA: *Notebook Entry*, IG p. 20, SNM No. 21
BM: pp. 12-13 (Item 9), pp. 50-51 (Item 9)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)

FOSS Energy
IG: pp. 249, 255, 264, 266
TR: pp. C23-C26, C46-C53

Disciplinary Core Ideas

PS4.C: Information Technologies and Instrumentation

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

FOSS Energy
IG: pp. 269 (Step 17), 267-268 (Steps 13-15), 271
SRB: pp. 58-64

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3)

FOSS Energy
IG: pp. 240, 255, 266 (Step 8)
TR: pp. D6-D9, D28-D29

GRADE 4-LS1-1

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-LS1-1

Students who demonstrate understanding can:
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, skin, quills, horns, tusks, scales, etc.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

FOSS Environments
IG: pp. 47, 49, 51
EA: *Response Sheet*, IG p. 211**,** SNM Nos. 12-13
BM: pp. 2-3 (Items 1-2)**,** pp. 4-5 (Item 3)**,** pp. 8-9 (Item 7)**,** pp. 16-17 (Item1a)**,** pp. 18-19 (Item 3)**,** pp. 20-21 (Item 5)**,** pp. 22-23 (Item 6)**,** pp. 28-29 (Item 1b)**,** pp. 34-35 (Item 6)**,** pp. 40-41 (Item 1d)**,** pp. 46-47 (Item 6)**,** pp. 48-49 (Items 2ab)
IA: *Life Science Task 1—Structure Function*

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence, data, and/or a model. (4-LS1-1)

FOSS Environments
IG: pp. 125, 129, 154, 161, 189, 263, 282, 291, 312, 313
TR: pp. C27-C31, C54-C55

Disciplinary Core Ideas

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

FOSS Environments
IG: pp. 126 (Steps 27-28), 153, 155, 160, 163, 185 (Step 25), 262 (Step 15), 273, 311 (Steps 48-49)
SRB: pp. 16-17, 91-92
DOR: "Virtual Investigation: Trout Range of Tolerance"

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (4-LS1-1)

FOSS Environments
IG: pp. 128, 141, 183, 186, 239, 269
TR: pp. D15-D17, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-LS1-2

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-LS1-2

Students who demonstrate understanding can:
Form an explanation to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
[Clarification Statement: Emphasis is on systems of information transfer. Examples include responses to stimuli such as a hot surface and pulling your hand away, animals running from predators, animals communicating with each other through signals to express danger, reproduction, and for food.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

FOSS Environments
IG: pp. 47, 49, 51
EA: IG pp. 212-213 (Step 22)
BM: pp. 6-7 (Items 5-6), pp. 8-9 (Item 8), pp. 18-19 (Item 3)**,** pp. 24-25 (Items 7-8)**,** pp. 32-33 (Item 4)
IA: *Life Science Task 2—Star Nosed Mole*

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)

FOSS Environments
IG: pp. 127, 153, 154, 180, 196, 201, 210
TR: pp. C11-C13, C34-C37

Disciplinary Core Ideas

LS1.D: Information Processing
- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

FOSS Environments
IG: pp. 145, 101 (Step 6), 208-209 (Step 13), 210-211 (Step 17), 212 (Steps 20-22), 215
SRB: pp. 17, 48-54
DOR: *Animal Language and Communication*
Sense of Hearing

Systems and System Models

Systems and System Models
- A system can be described in terms of its components and their interactions. (4-LS1-2)

FOSS Environments
IG: pp. 128, 141, 162, 170, 183, 186, 197
TR: pp. D15-D17, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-ESS1-1

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-ESS1-1

Students who demonstrate understanding can:
Identify evidence from patterns in rock formations and fossils in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
[Clarification Statement: Examples of evidence from patterns could include rock layers with shell fossils above rock layers with no shells, indicating a change from land to water over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 55
EA: *Performance Assessment*, IG p. 180 (Step 23)
EA: *Notebook Entry*, IG p. 197 (Step 15)
BM: pp. 12-13 (Item 8), pp. 18-19 (Item 1ab), pp. 22-23 (Item 4), pp. 30-31 (Items 1ab), pp. 32-33 (Item 2)
IA: *Earth Science Task 1—Changing Landscapes*

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
- Identify the evidence that supports particular points in an explanation. (4-ESS1-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 166, 175, 176, 178, 182, 188, 196, 248, 253, 254
TR: pp. C23-C26, C46-C53

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth
- Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 194-195 (Steps 5-6), 198-199 (Steps 16-18), 199-200 (Steps 20-23), 258
SRB: pp. 23-26, 27-30
DOR: *Fossils*
"Tutorial: Fossils"

Crosscutting Concepts

Patterns
- Patterns can be used as evidence to support an explanation. (4-ESS1-1)

FOSS Soils, Rocks, and Landforms
IG: pp.156, 164, 188, 216, 244
TR: pp. D6-D9, D28-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-ESS2-1

Earth and Space Science

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-ESS2-1

Students who demonstrate understanding can:
Make observations and metric measurements to provide evidence of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation.
[Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53
EA: *Observation*, IG p. 114 (Step 6)
EA: *Response Sheet***,** IG p. 118**,** SNM No. 3
EA: *Performance Assessment***,** IG p. 124 (Step 7)**,** IG p. 180 (Step 23)
BM: pp. 12-13 (Item 8)**,** pp. 18-19 (Items 1ab)**,** pp. 22-23 (Item 4)**,** pp. 30-31 (Items 1ab)**,** pp. 32-33 (Item 2)
IA: *Earth Science Task 2—Erosion*

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 103, 114, 124, 139, 163, 175, 176, 179. 182 (Step 28), 187
TR: pp. C14-C17, C38-C41
DOR: "Virtual Investigation: Stream Tables"

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 124, 129-130 (Steps 18-21), 131-132 (Step 23), 142, 168-169 (Steps 18-20), 181 (Step 27), 182 (Step 28), 201
SRB: pp. 6-8, 9-14
DOR: *Weathering and Erosion*
"Tutorial: Weathering"

ESS2.E: Biogeology

- Living things affect the physical characteristics of their regions. (4-ESS2-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 89, 92-93, 101 (Step 3), 142
SRB: pp. 4-5
DOR: *Soils*
"Tutorial: Soil Formation"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 114, 117, 119, 124, 127, 128, 133, 164, 166, 169, 175, 177, 178, 187, 189, 195, 196
TR: pp. D10-D12, D28-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-ESS2-2

Students who demonstrate understanding can:
Analyze and interpret data from maps to describe patterns of Earth's features.
[Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53
EA: *Performance Assessment***,** IG p. 180 (Step 23)**,** IG p. 245 (Step 5)
BM: *pp. 6-7 (Items 4ab),* pp. 16-17 (Items 11ab)*,* pp. 42-43 (Items 1abc)*,* pp. 48-49 (Item 6)

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 164, 176, 180, 233, 236, 237, 244, 253
TR: pp. C18-C20, C40-C45

Disciplinary Core Ideas

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 227 (Steps 21-23), 239 (Step 16), 240 (Step 18), 256 (Steps 9-11), 258
SRB: pp. 31-33, 38-49
DOR: *Volcanoes*
"Topographer"

Crosscutting Concepts

Patterns

- Patterns can be used as evidence to support an explanation. (4-ESS2-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 164, 180, 188, 244
TR: pp. D6-D9, D28-D29

GRADE 4-ESS3-1

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-ESS3-1

Students who demonstrate understanding can:
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. *[Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]*

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 55
EA: *Response Sheet*, IG p. 280, SNM No. 18
EA: *Notebook Entry*, IG p. 291 (Step 15)
BM: pp. 8-9 (Item 6)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods.

- Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 277, 279, 280, 281, 282, 291, 299
TR: pp. C32-C33, C56-C61

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 268-270, 278 (Step 6), 283 (Step 15), 301
DOR: *Natural Resources*
"Resource ID"
"Virtual Investigation: Natural Resources"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 277 (Step 2), 290
TR: pp. D10-D12, D28-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 4-ESS3-2

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 4-ESS3-2

Students who demonstrate understanding can:
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
[Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.]

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 55
EA: *Notebook Entry*, IG p. 255 (Step 9)
BA: pp. 14-15 (Items 9-10)**,** pp. 50-51 (Items 7ab)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 207, 208, 215, 248, 253, 254
TR: pp. C23-C26, C46-C53

Disciplinary Core Ideas

ESS3.B: Natural Hazards

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 212-213, 217, 239 (Step 16), 240 (Step 18), 254-255 (Step 6), 258
DOR: *Volcanoes*
All About Earthquakes

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2)

FOSS Soils, Rocks, and Landforms
IG: pp. 216, 253, 254
TR: pp. D10-D12, D28-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1-1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-1

Students who demonstrate understanding can:
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart. They could include an object, tool, process, or system either at home or school that may make life easier or more efficient.]

FOSS Energy
IG: pp. 59, 61, 65
EA: *Performance Assessment*, IG p. 164 (Step 4), IG p. 381 (Step 18)
BM: pp. 46-47 (Item 7)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3–5-ETS1-1) ***FOSS Energy*** **IG:** pp. 163, 164, 168, 381 **TR:** pp. C7-C10, C34-C35	**ETS1.A: Defining and Delimiting Engineering Problems** • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3–5-ETS1-1) ***FOSS Energy*** **IG:** pp. 163-164 (Step 3), 169, 379 (Step 13), 381, 384	

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1-2

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-2

Students who demonstrate understanding can:
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. *[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart. This is a continuation of the previous standard.]*

FOSS Energy
IG: pp. 59, 61, 65
EA: *Performance Assessment*, IG p. 381 (Step 18)
BM: pp. 18-19 (Item 2a)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3–5-ETS1-2) ***FOSS Soils, Rocks, and Landforms*** **IG:** pp. 248, 291, 296, 297 ***FOSS Energy*** **IG:** p. 391 **TR:** pp. C23-C26, C46-C53	**ETS1.B: Developing Possible Solutions** • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3–5-ETS1-2) • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3–5-ETS1-2) ***FOSS Energy*** **IG:** pp. 163-164 (Step 3),169, 380-381 (Step 17), 384	

GRADE 3–5-ET1-3

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-3

Students who demonstrate understanding can:
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. *[Clarification Statement: Refer to the Engineering Design Process for a visual flow chart. This is a continuation of 4-ET1-2.]*

FOSS Energy
IG: pp. 59, 61, 63, 65
EA: *Performance Assessment*, IG p. 381 (Step 18)
BM: pp. 18-19 (Item 2a)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3–5-ETS1-3)

FOSS Energy
IG: pp. 163 (Step 3), 215-220, 254-256

TR: pp. C14-C17, C38-C41

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3–5-ETS1-3)

FOSS Energy
IG: pp. 163-166, 169, 377-381, 384

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3–5-ETS1-3)

FOSS Energy
IG: pp. 163-166, 169,
246-249, 269-270, 271, 377-381, 384

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-PS1-1

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-PS1-1

Students who demonstrate understanding can:
Develop a model to describe that matter is made of particles too small to be seen.
[Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

FOSS Earth and Sun
IG: pp. 57, 61, 63
EA: *Notebook Entry*, IG p. 264 (Step 21)
EA: *Performance Assessment,* IG p. 258 (Step 7)
BM: pp. 12-13 (Item 8), pp. 38-39 (Items 1 and 2), pp. 40-41 (Items 3ab), pp. 42-43 (Items 5 and 6), pp. 44-45 (Items 7abc), pp. 48-49 (Items 2ab) pp. 54-55 (Item 6)

FOSS Mixtures and Solutions
IG: pp. 49, 55
EA: *Notebook Entry*, IG p. 111 (Step 20), IG p. 210 (Step 17), IG p. 239 (Step 11)
EA: *Performance Assessment,* IG p. 226 (Step 4), IG p. 284 (Step 7)
EA: *Response Sheet*, IG p. 219, SNM No. 12, IG p. 279SNM No. 15
BM: pp. 14-15 (Item 10), pp.16-17 (Items 1ab), pp. 18-19 (Item 3), pp. 22-23 (Items 6ab), pp. 24-25 (Items 7 and 8), pp. 34-35 (Item 1a), pp. 40-41 (Item 2)
IA: *Physical Science Task 1—The Science of Party Planning*

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Develop a model to describe phenomena. (5-PS1-1)

FOSS Earth and Sun
IG: p 239, 251, 258, 260, 264, 273 (Step 14), 286 (Step 19)
DOR: "Tutorial: Air and Atmosphere"

FOSS Mixtures and Solutions
IG: pp. 97, 115 (Step 8), 118 (Teaching Note), 147, 157, 163, 164, 166, 167, 168 (Steps 26-28), 179 (Step 13), 184 (Step 6), 186 (Step 10), 190, 209-210 (Steps 13-14), 211, 219 (Step 16), 279, 321 (Step 1), 344 (Step 14), 345 (Step 16, Teaching Note)
SRB: pp. 14-15, 26-27, 28-29, 30, 32, 47, 48

TR: pp. C11-C13, C36-C39

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)

FOSS Earth and Sun
IG: pp. 239, 241, 250, 259 (Step 10), 260 (Steps 13-14), 261, 262 (Step 17), 273 (Step 14), 286 (Step 19), 290
SRB: pp. 105-108, 121
DOR: *"Tutorial: Air and Atmosphere"*

FOSS Mixtures and Solutions
IG: pp. 111, 115 (Step 8), 116 (Step 9 and Teaching Note), 142, (Step 18), 156, 221-222 (Steps 19-21), 230, 258, 265 (Step 9), 268 (Step 16), 314-15, 330 (Step 6), 332 (Step 12), 341 (Steps 4 and 6)
SRB: pp. 7, 24, 26-27,32, 42-43, 75

Crosscutting Concepts

Scale, Proportion, and Quantity
- Natural objects exist from the very small to the immensely large. (5-PS1-1)

FOSS Earth and Sun
IG: pp. 252, 260 (Step 14), 268, 282

FOSS Mixtures and Solutions
IG: pp. 98, 109, 115 (Step 8), 127, 202, 208 (Step 9), 226, 227, 268, 316, 342
SRB: pp. 8, 26, 27
TR: pp. D13-D15, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

	DOR: *"Tutorial: Solutions"* *"Tutorial: Conservation of Mass"* *Changes in Properties of Matter)* *Chemical Reactions*	

GRADE 5-PS1-2

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-PS1-2

Students who demonstrate understanding can:
Measure and graph metric quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. *[Clarification Statement: Examples of reactions or changes could include dissolving, and mixing. Examples of physical changes could include ice melting into water. Distinguish between mass and weight. Weight is a measure of gravitational force on an object. Weight of an object can change depending upon gravitational force. Ex. Earth vs. the moon. Mass is the amount of matter in an object.]*

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53, 55
EA: *Notebook Entry,* IG p. 269 (Step 21)
EA: *Performance Assessment,* IG p. 226 (Step 4) IG p. 284 (Step 7)
EA: *Response Sheet,* IG p. 117**,** SNM No. 4**,** IG p. 188**,** SNM No. 8**,** IG p. 219**,** SNM No. 12**,** IG p. 279**,** SNM No. 15
BM: pp. 2-3 (Items 1 and 2)**,** pp. 8-9 (Items 6ab)**,** pp. 12-13 (Items 9ab), pp. 14-15 (Items 11 and 12)**,** pp. 20-21 (Item 4)**,** pp. 22-23 (Items 6ab), pp. 34-35 (Item 1a), pp. 42-43 (Items 4ab), pp. 50-51 (Items 4 and 5)
IA: *Physical Science Task 1—The Science of Party Planning*

Science and Engineering Practices

Using Mathematics and Computational Thinking
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

- Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

FOSS Mixtures and Solutions
IG: pp. 97, 115 (Steps 6-7), 117, 188 (Step 14), 209-210 (Step 13), 239, 277 (Steps 8-9), 287
SRB: pp. 11, 14-15, 30-31
DOR: "Tutorial: Conservation of Mass"
TR: pp. C21-C22, C46-C47

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)

FOSS Mixtures and Solutions
IG: pp. 115 (Step 8), 116 (Step 9), 117 (Step 13), 184 (Step 5), 203, 222, 258, 278 (Step 12), 279 (Step 19), 286 (Step 16), 345 (Step 16)
SRB: pp. 10, 11, 30, 31
DOR: *"Tutorial: Concentration"*
"Tutorial: Solutions"
Changes in Properties of Matter

PS1.B: Chemical Reactions

- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (5-PS1-2)

FOSS Mixtures and Solutions
IG: pp. 314-15, 334 (Step 18), 341 (Steps 4-6), 342 (Step 7), 344 (Step 15), 347 (Steps 20-21)
SRB: pp. 74-78

Crosscutting Concepts

Scale, Proportion, and Quantity

- Metric units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2)

FOSS Mixtures and Solutions
IG: pp. 114 (Step 2), 115 (Step 7), 190, 202, 217, 260, 301
SRB: pp. 11, 22, 40, 47, 81
TR: pp. D13-D15, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-PS1-3

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-PS1-3

Students who demonstrate understanding can:
Make observations and measurements to identify materials based on their properties.
[Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility.] [Assessment Boundary: At this grade level no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.]

FOSS Mixtures and Solutions
IG: pp. 49, 53, 55
EA: *Performance Assessment,* IG p. 226 (Step 4) IG p. 284 (Step 7)
EA: *Response Sheet,* IG p. 279, SNM No. 15
BM: pp. 6-7 (Item 5)**,** pp. 8-9 (Item 7)**,** pp. 10-11 (Item 8)**,** pp. 40-41 (Item 3)**,** pp. 44-45 (Item 7)**,** pp. 48-49 (Item 3)**,** pp. 52-53 (Items 6ab)**,** pp. 54-55 (Items 7ab)

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions

- Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

FOSS Mixtures and Solutions
IG: pp. 259, 267, 277, 284, 285, 295, 321, 322, 329, 341
SRB: pp. 14-15
TR: pp. C14-C17, C46-C47

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

FOSS Mixtures and Solutions
IG: pp. 249, 258, 277 (Steps 9-10), 279 (Step 17), 284 (Step 5), 286 (Step 16), 329 (Step 3), 332 (Step 12)
SRB: pp. 9 and 22
DOR: *"Tutorial: Saturation"*
"Tutorial: Solutions"

Crosscutting Concepts

Scale, Proportion, and Quantity

- Metric units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-3)

FOSS Mixtures and Solutions
IG: pp. 268 (Step 16), 277 (Step 8), 284, 342
SRB: pp. 18-20, 38-40
TR: pp. D13-D15, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-PS1-4

Matter and Its Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-PS1-4

Students who demonstrate understanding can:
Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
[Clarification Statement: Examples of mixtures, not new substances, could be mixing of salt or sugar and water. Examples of new substances include making gelatin, chocolate milk, cookies, and cakes.]

FOSS Mixtures and Solutions
IG: pp. 49, 55
EA: *Notebook Entry,* IG p. 325 (Step 20)
EA: *Response Sheet,* IG p. 332**,** SNM No. 18
BM: pp. 4-5 (Item 3a)**,** pp. 6-7 (Item 4)**,** pp. 8-9 (Item 7)**,** pp. 12 -13 (Items 9ab)**,** pp. 14-15 (Item 12)
IA: *Physical Science Task 2—Mixing Matter*

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)

FOSS Mixtures and Solutions
IG: pp. 315, 321, 322, 329-330 (Steps 3-6), 340-341(Steps 2-3)
TR: pp. C14-C17, C46-C47

Disciplinary Core Ideas

PS1.B: Chemical Reactions

- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)

FOSS Mixtures and Solutions
IG: pp. 307, 314-315, 325 (Step 20), 326 (Step 23), 330 (Step 7), 332 (Steps 12-13), 335 (Step 20), 341 (Step 6)
SRB: pp. 74-78, 79-80
DOR: *Chemical Reactions*
Changes in Properties of Matter
"Tutorial: Reaction or not?"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

FOSS Mixtures and Solutions
IG: pp. 316, 325, 332, 335, 341
SRB: pp. 79-80
TR: pp. D10-D12, D30-D31

GRADE 5-PS3-1

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-PS3-1

Students who demonstrate understanding can:
Use models to describe that energy from the sun is converted into food (used for body repair, growth, motion, and to maintain body warmth).
[Clarification Statement: Examples of models could include food webs, diagrams, and flow charts to illustrate flow of energy.]

FOSS Living Systems
IG: pp. 47, 49, 51, 53, 55
EA: *Notebook Entry,* IG p. 175 (Step 16)
EA: *Response Sheet,* IG p. 123, SNM No. 4**,** IG p. 190, SNM No. 11
BM: pp. 4-5 (Item 1c)**,** pp. 10-11 (Item 6)**,** pp. 20-21 (Item 3)**,** pp. 22-23 (Items 5ab)**,** pp. 24-25 (Item 7)**,** pp. 28-29 (Items 9 and 10)**,** pp. 34-35 (Items 4 and 5)**,** pp. 36-37 (Item 6)

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Use models to describe phenomena. (5-PS3-1)

FOSS Living Systems
IG: pp. 88, 115, 123, 151, 172, 176, 209, 224, 240, 242, 257
TR: pp. C11-C13, C36-C39

Disciplinary Core Ideas

PS3.D: Energy in Chemical Processes and Everyday Life
- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

FOSS Living Systems
IG: pp. 83, 110 (Step 13), 115 (Step 26), 121 (Step 3), 123 (Step 14), 126 (Step 20), 150-151, 172 (Step 9), 173 (Step 11), 315 (Step 12)
SRB: pp. 7, 8, 24, 26
DOR: *Food Chains*
Web of Life: Life in the Sea

LS1.C: Organization for Matter and Energy Flow in Organisms
- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)

FOSS Living Systems
IG: pp. 110 (Step 12), 112 (Step 18), 113 (Step 22), 122, 130 (Step 1), 143, 150-151, 161-162 (Steps 18-19), 191 (Step 22), 208-209, 242 (Step 18)
SRB: pp. 27-31
DOR: *Food Chains*
Web of Life: Life in the Sea

Crosscutting Concepts

Energy and Matter
- Energy can be transferred in various ways and between objects. (5-PS3-1)

FOSS Living Systems
IG: pp. 89, 111 (Step 14), 112, 115, 123, 126 (Step 20), 137, 152, 160, 172, 173, 193, 210, 229, 311, 313
TR: pp. D19-D21, D38-D41

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-LS1-1

From Molecules to Organisms: Structures and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-LS1-1

Students who demonstrate understanding can:
Support an argument that plants get the materials they need for growth chiefly from air and water.
[Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

FOSS Living Systems
IG: pp. 47, 51, 53
BM: pp. 2-3 (Item 1a), pp. 12-13 (Item 7), pp. 30-31 (Item 1), pp. 32-33 (Item 2), pp. 40-41 (Item 9), pp. 42-43 (Item 1a) , pp. 44-45 (Item 1b) pp. 46-47 (Item 3), pp. 50 -51 (Item 5)
IA: *Life Science Task 1—Plant Growth*

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model. (5-LS1-1)

FOSS Living Systems
IG: pp. 172, 190, 193
TR: pp. C27-C32, C50-C53

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants acquire their material for growth from carbon dioxide, the sun, and water through the process of photosynthesis. (5-LS1-1)

FOSS Living Systems
IG: pp. 171-173 (Steps 7-9), 173 (Step 11), 223 (Step 28), 225-226 (Steps 30-33)
SRB: pp. 23-26, 40-42, 74, 77
DOR: *Plant Structure and Growth*
"Plant Vascular System"

Crosscutting Concepts

Energy and Matter

- Matter is transported into, out of, and within systems. (5-LS1-1)

FOSS Living Systems
IG: pp. 172, 173 193, 210, 229, 257, 272, 313
SRB: pp. 23 and 26

TR: pp. D19-D21, D38-D41

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EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-LS2-1

Ecosystems: Interaction, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-LS2-1

Students who demonstrate understanding can:
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
[Clarification Statement: Examples of systems could include organisms, ecosystems (decay), and the Earth. Consider teaching the carbon cycle, nitrogen cycle, and water cycle. Crop rotation is often due to the amount of nitrogen in the soil. Soybeans and other legumes can pull nitrogen from the air and convert it into a usable form.]

FOSS Living Systems
IG: pp. 49, 51, 53, 55
EA: *Notebook Entry,* IG p. 102 (Step 13)**,** IG p. 116 (Step 29)**,** IG p. 230 (Step 40)
EA: *Performance Assessment***,** IG p. 132 (Step 6)**,** IG p. 249 (Step 4)
EA: *Response Sheet,* IG p. 123**,** SNM No. 4**,** IG p. 243**,** SNM No. 16
BM: pp. 4-5 (Items 1bd)**,** pp. 6-7 (Item 3)**,** pp. 8-9 (Items 4 and 5)**,** pp. 14-15 (Item 10)**,** pp. 18-19 (Items 1ab and 2)**,** pp. 20-21 (Item 4)**,** pp. 22-23 (Items 5ab)**,** pp. 26-27 (Items 8ab)**,** pp. 32-33 (Item 3)**,** pp. 34-35 (Item 4)**,** pp. 36-37 (Item 7)**,** pp. 38-39 (Item 8)**,** pp. 44-45 (Item 2)**,** pp. 48-49 (Item 4)**,** pp. 50-51 (Items 6 and 7)**,** pp. 52-53 (Item 8)
IA: *Life Science Task 2—Penguins*

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 models and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena. (5-LS2-1)

FOSS Living Systems
IG: pp. 88, 113, 115, 122, 123, 137, 151, 165, 176, 193, 209, 237, 240, 242, 257

TR: pp. C11-C13, C36-C39

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

FOSS Living Systems
IG: pp. 79, 81, 83-84, 90-91, 110-113,121 (Step 4), 122, 123, 125 (Step 17), 126 (Step 20), 130, 150-151, 162 (Step 19), 192 (Step 24), 312 (Step 4)
SRB: pp. 7-10, 14-15,16, 17, 18-20, 26, 27, 29-31, 71, 74-77
DOR: *Food Chains*
Marine Ecosystems
Web of Life: Life in the Sea
"Food Webs"

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-LS2-1)

FOSS Living Systems
Module driving question: How can we describe Earth's biosphere as a system of interacting parts? (p.317)
IG: pp. 99, 102, 122, 132, 162, 173, 184, 229, 230, 240, 242, 311, 312, 313, 316
SRB: pp. 3-4, 5-6, 11, 40, 42, 50, 54-55, 56-57, 62-63
DOR: *Circulatory and Respiratory Systems*
Digestive and Excretory System
The Brain and the Nervous System
TR: pp. D16-D18, D34-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
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	• Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. (5-LS2-1) ***FOSS Living Systems*** **IG:** pp. 79, 81, 83, 125 (Step 17), 137, 150-151, 157 (Step 3), 161 (Step 15), 172 (Step 9), 208-209, 223 (Step 28), 224 (Step 29), 254 (Steps 12 and 15), 311 (Step 1), 312 (Step 4), 315, 316 **SRB:** pp. 17, 18-20, 24-25, 28, 36, 40-41, 48-53, 54-55, 56-57 **DOR:** *Circulatory and Respiratory Systems* *"Plant Vascular System"*	

GRADE 5-ESS1-1

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-ESS1-1

Students who demonstrate understanding can:
Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
[Clarification Statement: Examples of stars distance from Earth and their relative brightness] [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]

FOSS Earth and Sun
IG: pp. 57, 59
EA: *Notebook Entry,* IG p. 182 (Step 18) IG 229 (Step 15)
BM: pp. 4-5 (Items 3ab)**,** pp. 32-33 (Item 5)**,** pp. 34-35 (Item 6)
IA: *Earth Science Task 1—Star Brightness*

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model. (5-ESS1-1)

FOSS Earth and Sun
IG: pp. 167, 177, 189, 217

FOSS Earth and Sun
SRB: pp. 20-24
TR: pp. C27-C32, C50-C53

Disciplinary Core Ideas

ESS1.A: The Universe and its Stars

- The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)

FOSS Earth and Sun
IG: pp. 151, 154, 155, 165-166, 169-70, 177-178 (Step 9), 181 (Step 16), 182, 185, 190-191 (Step 8), 194 (Step 15), 223 (Step 2), 228 (Step 13), 230 (Step 17), 231 (Step 20), 233
SRB: pp. 15, 22, 48-49, 66-67, 70, 78
DOR: *All about the Stars*

Crosscutting Concepts

Scale, Proportion, and Quantity

- Natural objects exist from the very small to the immensely large. (5-ESS1-1)

FOSS Earth and Sun
IG: pp. 168, 181, 188, 189, 190, 191, 194, 233
TR: pp. D13-D15, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-ESS1-2

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-ESS1-2

Students who demonstrate understanding can:
Construct a graph to reveal patterns of daily changes in length (metric) and direction of shadows, length of day and night, and the seasonal appearance of some stars in the night sky.
[Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]

FOSS Earth and Sun
IG: pp. 57, 59

EA: *Notebook Entry*, IG pp. 142-143 (Steps 27-29), IG p. 182 (Step 18) IG p. 229 (Step 15)
EA: *Response Sheet*, IG p. 127, SNM No. 3
BM: pp. 2-3 (Items 1ab), pp. 4-5 (Item 2), pp. 16-17 (Items 12 and 13), pp. 18-19 (Items 1ab), pp. 20-21 (Items 3 and 4), pp. 22-23 (Items 5ab) pp. 24-25 (Item 6), pp. 26-27 (Items 7ab), pp. 28-29 (Item 2), pp. 30-31 (Items 3abc), pp. 34-35 (Items 7ab), pp. 36-37 (Item 8)
IA: *Earth Science Task 2—Shadows*

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)

FOSS Earth and Sun
IG: pp. 101, 112, 122, 124, 136, 143, 178, 181, 199, 209
TR: pp. C18-C20, C44-C45

Disciplinary Core Ideas

ESS1.B: Earth and the Solar System

- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)

FOSS Earth and Sun
IG: pp. 57, 93, 95 100-101, 111, 113 (Step 12), 115, 122 (Step 13), 124 (Step 19), 126 (Step 22), 128 (Step 25), 132, 133-139 (Steps 5-20), 142 (Steps 26-27), 144, 145 (Step 31), 155, 165-166, 177 (Step 9), 185, 228-229, 234 (Step 22)
SRB: pp. 3-7, 10-13, 34-35
DOR: *"Tutorial: Sun Tracking"*
Shadow Tracker

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)

FOSS Earth and Sun
IG: pp. 102, 113, 122, 124, 143, 178, 185, 199, 211, 229, 233
SRB: p.13
TR: pp. D6-D9, D28-D29

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EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-ESS2-1

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-ESS2-1

Students who demonstrate understanding can:
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
[Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere (water cycle). The geosphere, hydrosphere, atmosphere, and biosphere are each a system.]

FOSS Living Systems
IG: pp. 49, 55
EA: *Notebook Entry*, IG p. 102 (Step 13) IG p. 116 (Step 29)
EA: *Performance Assessment*, IG p. 132 (Step 6)
BM: pp. 14-15 (Items 9ab), pp. 24-25 (Item 6)

FOSS Earth and Sun
IG: pp. 57, 61
EA: *Notebook Entry*, IG p. 273 (Step 12), IG p. 333 (Step 28)
EA: *Performance Assessment,* IG p. 386 (Step 12)
EA: *Response Sheet,* IG p. 353, SNM No. 22
BM: pp. 6-7 (Item 4), pp. 8-9 (Item 5), pp. 12-13 (Item 8), pp. 14-15 (Items 10 and 11), pp. 28-29 (Item 1), pp. 42-43 (Item 4), pp. 44-45 (Items 7abc) pp. 46-47 (Items 1ab), pp. 48-49 (Items 2ab and 3), pp. 50-51 (Item 4), pp. 52-53 (Item 5), pp. 54-55 (Item 6)

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model using an example to describe a scientific principle. (5-ESS2-1)

FOSS Living Systems
IG: pp. 88, 113, 122, 130, 137

FOSS Earth and Sun
IG: pp. 258, 260, 361, 377, 386-387, 401, 404, 422 (Step 21)

TR: pp. C11-C13, C36-C39

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

FOSS Living Systems
IG: 79, 87, 106, 107 (Step 6), 108, 114 (Step 26), 115, 126 (Step 20), 137, 261, 269, 313 (Step 8), 316
SRB: pp. 7-11, 74-78
DOR: *Marine Ecosystems*

FOSS Earth and Sun
IG: pp. 239, 250, 272 (Step 11), 286, 287, 304-305, 345, 367, 376-377, 379, 386-387 (Steps 14-15), 405 (Steps 14, 17), 410 (Step 27), 411, 422 (Step 21), 423 (Step 24)
SRB: pp. 81-84, 85-91, 105-109, 120-123 125-129, 130-138, 139-143
DOR: *All about Meteorology*

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-ESS2-1)

FOSS Living Systems
IG: pp. 79, 81, 82-83, 87, 90-91, 97, 99, 102, 122, 132, 137, 261, 311, 312, 313, 316
SRB: pp. 3-4

DOR: *Geography for Students - Physical Systems*

FOSS Earth and Sun
IG: pp. 252, 258, 259, 261, 268, 286, 378, 386-387 (Steps 14-15), 395, 402, 405, 417, 419, 422 (Step 21)

TR: pp. D16-D18, D34-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

	Water Cycle *“Water Cycle Game”*	

GRADE 5-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-ESS2-2

Students who demonstrate understanding can:
Describe and graph the amounts and percentages of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
[Clarification Statement: Emphasis on freshwater and salt water in oceans, glaciers, groundwater, and surface water.] [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]

FOSS Earth and Sun
IG: pp. 57, 63
EA: *Notebook Entry*, IG p. 406 (Step 20)
BM: pp.10-11 (Items 7ab)

Science and Engineering Practices

Using Mathematics and Computational Thinking
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

- Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

FOSS Earth and Sun
IG: pp. 377, 394, 400 401-402, 403-404
SRB: p. 124
TR: pp. C21-C22, C46-C47

Disciplinary Core Ideas

ESS2.C: The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

FOSS Earth and Sun
IG: pp. 367, 376-377, 379, 400, 401-402, 404 (Step 14), 406 (Step 20), 422
SRB: p. 124
DOR: *"Water Cycle Game"*

Crosscutting Concepts

Scale, Proportion, and Quantity

- Metric units are used to measure and describe physical quantities such as length, mass, and volume. (5-ESS2-2)

FOSS Earth and Sun
IG: pp. 402, 417, 419, 422
TR: pp. D13-D15, D32-D33

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 5-ESS3-1

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 5-ESS3-1

Students who demonstrate understanding can:
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
[Clarification Statement: Consider research on human-impact to the environment. Examples could include habitat destruction/construction, overuse of natural resources, urban development, overpopulation, cover crops, no-till farming, etc.]

FOSS Living Systems
IG: pp. 47, 55
BM: pp. 16-17 (Item 11)

FOSS Earth and Sun
IG: pp. 57, 61, 63
EA: *Notebook Entry*, IG p. 421 (Step 20)
BM: pp. 8-9 (Item 6), pp. 14-15 (Item 10), pp. 56-57 (Item 7)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

- Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)

FOSS Living Systems
IG: pp. 271, 296, 304, 307, 315, 316

FOSS Earth and Sun
IG: pp. 331, 332, 355, 359, 360, 361 (Step 28), 408, 416, 419, 422 (Step 21)
TR: pp. C33-C35, C52-C55

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

FOSS Living Systems
IG: pp. 108 (Step 6), 270, 307, 309 (Step 4), 316
SRB: pp. 73, 74-80
DOR: *Marine Ecosystems*

FOSS Earth and Sun
IG: pp. 295, 346, 359-360 (Steps 26-27), 361, 376-377, 421 (Step 20), 422
SRB: pp. 144-151
DOR: *Climate and Seasons*

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-ESS3-1)

FOSS Living Systems
IG: pp. 272, 278, 280, 297, 311, 312, 313, 316
SRB: pp. 3-4, 5-6

FOSS Earth and Sun
IG: pp. 386, 387, 388, 395, 402, 405, 417, 419, 422 (Step 21)
TR: pp. D16-D18, D34-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-1

Students who demonstrate understanding can:
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. *[Clarification Statement: Refer to the Engineering Design Process in the link above for a visual flow chart. They could include an item/object either at home or school that may make life easier or more efficient.]*

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53
EA: *Notebook Entry,* IG p. 298 (Step 21)
BM: pp. 4-5 (Item 3a)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3–5-ETS1-1) ***FOSS Mixtures and Solutions*** **IG:** pp. 97, 127,132 (Steps 19-20), 259, 287, 297, 299 (Step 23) **SRB:** pp. 14-15 **TR:** pp. C7-C11, C36-C37	**ETS1.A: Defining and Delimiting Engineering Problems** • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3–5-ETS1-1) ***FOSS Mixtures and Solutions*** **IG:** pp. 96, 127 (Step 6), 127 (Step 9), 132 (Step 21), 297 (Steps 16-21), 301 (Step 29) **SRB:** pp. 54-61	

GRADE 3–5-ET1-2

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-2

Students who demonstrate understanding can:
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. *[Clarification Statement: Refer to the Engineering Design Process in the link above for a visual flow chart. This is a continuation of the previous standard.]*

FOSS Earth and Sun
IG: pp. 57, 59, 61
EA: *Performance Assessment,* IG p. 355 (Step 14)
BM: pp. 14-15 (Item 10)**,** pp. 56-57 (Item 8)

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53
EA: *Notebook Entry,* IG p. 298 (Step 21)
EA: *Performance Assessment,* IG p. 127 (Steps 6-9)
BM: pp. 4-5 (Item 3a)**,** pp. 6-7 (Item 4)**,** pp. 8-9 (Item 7)**,** pp. 12-13 (Items 9ab)**,** pp. 14-15 (Item 12)**,** pp. 18-19 (Item 2)**,** pp. 22-23 (Item 6b)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3–5-ETS1-2)

FOSS Earth and Sun
IG: pp. 305 and 358

FOSS Mixtures and Solutions
IG: pp. 97, 128, 132 (Step 21), 297, 299 (Step 25)
SRB: pp. 14-15, 62-67
TR: pp. C23-C26, C48-C51

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3–5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3–5-ETS1-2)

FOSS Earth and Sun
IG: pp. 304-305, 354 (Step 7), 357 (Step 20), 361

FOSS Mixtures and Solutions
IG: pp. 127 (Steps 6-9), 297 (Step 19), 301
SRB: pp. 50-53

Crosscutting Concepts

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

GRADE 3–5-ET1-3

3–5-ETS1-3 Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation 3–5-ETS1-3

Students who demonstrate understanding can:
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. *[Clarification Statement: Refer to the Engineering Design Process in the link above for a visual flow chart. This is a continuation of the previous standard.]*

FOSS Earth and Sun
IG*: pp. 57, 61*
EA: *Performance Assessment, IG p. 355 (Step 14)*
BM: *pp. 14-15 (Item 11)*

FOSS Mixtures and Solutions
IG*: pp. 49, 51*
BM: *pp. 4-5 (Item 3a)*

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3–5-ETS1-3)

FOSS Earth and Sun
IG: pp. 294, 313, 315, 325, 339, 340, 353, 355

FOSS Mixtures and Solutions
IG: pp. 88, 96, 128 (Step 13), 132 (Step 19), 137-138 (Steps 6-8)
SRB: pp. 14-15
TR: pp. C14-C17, C46-C47

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3–5-ETS1-3)

FOSS Earth and Sun
IG: pp. 295, 304-305

FOSS Mixtures and Solutions
IG: pp. 3, 96, 127 (Step 9), 132 (Steps 19-21)

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3–5-ETS1-3)

FOSS Earth and Sun
IG: pp. 295, 304-305, 354 (Step 7)

FOSS Mixtures and Solutions
IG: pp. 96, 132 (Steps 19-21)

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS1-1

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS1-1

Students who demonstrate understanding can:
Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
[Clarification Statement: Examples of models can be physical, graphical, or conceptual.]

FOSS Planetary Science
IG: pp. 55, 57, 59, 61, 63, 65, 73
EA: *Notebook Entry,* IG pp. 209-210 (Step 25)*,* IG pp. 304-305 (Steps 7-8)
EA: *Performance Assessment,* IG p. 148 (Step 11) IG p. 177 (Step 13), IG p. 288 (Steps 21- 22)**,** IG p. 289 (Step 26), IG p. 296 (Step 6)
EA: *Response Sheet,* IG p. 194**,** Student Notebook Master No. 8**,** IG p. 297, Student Notebook Master No. 29
EA: *Review Notebook Entries***,** IG (Step 14)**,** IG p. 220 (Step 29)**,** IG p. 260 (Step 19)**,** IG p. 304 (Step 6)**,** IG p. 358 (Step 23)
BM: *Assessment Coding Guide,* pp. 2-3 (Item 3)*,* pp. 6-7 (Item 4)*,* pp. 10-15 (Items 1-3)*,* pp. 16-20 (Items 4-7)*,* pp. 22-23 (Item 1)*,* pp. 24-29 (Items 3-6)*,* pp. 58-59 (Item 1)*,* pp. 60-67 (Items 3-7)

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-ESS1-1)

FOSS Planetary Science
IG: pp. 167, 175, 188, 191, 204, 214 (D), 220, 275, 284, 285, 286, 287, 288, 295, 296
SRB: pp. 11, 12, 23, 26
TR: pp. C14-C17, C46-C51

Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars

- Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)

FOSS Planetary Science
***IG:** pp. 146 (Step 6), 166, 175, 176, 274, 277, 281, 283, 289, 302 (Step 1)*
***SRB:** pp. 43-45*
***DOR:** "Day and Night"*
"Phases of the Moon"
"Moon Puzzle"

ESS1.B: Earth and the Solar System

- This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)

FOSS Planetary Science
IG: pp. 153, 166, 169, 185-220, 189 (Step 9), 190, 191, 192, 193, 203, 210 (Step 26), 211, 220, 288, 306
SRB: pp. 15-21, 45-48
DOR: *"Seasons"*
"Day and Night"

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1)

FOSS Planetary Science
IG: pp. 168,177, 178, 183, 203, 208, 220, 276, 281, 282, 284, 287, 289, 295, 297
SRB: pp. 34-37
TR: pp. D9, D13, D22-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS1-2

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS1-2

Students who demonstrate understanding can:
Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
[Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as their school or state).] [Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]

FOSS Planetary Science
IG: pp. 55, 67, 69
EA: *Notebook Entry,* IG p. 418 (Step 16), IG p. 419 (Step 21)
EA: *Performance Assessment,* IG pp. 409-410 (Step 13)
EA: *Review Notebook Entries***,** IG p. 420 (Step 22)**,** IG p. 488 (Step 22)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 5)**,** pp. 38-39 (Items 7 and 8)**,** pp. 70-71 (Item 11)

FOSS Gravity and Kinetic Energy
IG: pp. 49, 53
EA: *Notebook Entry,* IG p. 187 (Step 20)
EA: *Review Notebook Entries***,** IG p. 195 (Step 26)
BM: *Assessment Coding Guide***,** pp. 2-3 (Item 2)**,** pp. 18-19 (Item 3), pp. 20-21 (Item 5), pp. 22-23 (Item 7)**,** pp. 38-39 (Item 10)**,** pp. 42-43 (Item 13)

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-ESS1-2)

FOSS Planetary Science
IG: pp. 400, 405, 414, 420, 437, 444, 445, 447, 448
SRB: pp. 82, 135

FOSS Gravity and Kinetic Energy
IG: pp. 159, 179, 183, 188, 195
SRB: pp. 31-36
TR: pp. C14-C17, C46-C51

Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)

FOSS Planetary Science
IG: pp. 365, 374, 377, 386 (Step 13), 397-400, 404 (Step 1), 408,420
SRB: pp. 76-79
SNM: Nos. 4-6
DOR: *"Solar System Origin Card Sort"*
"Cosmos Card Sort"

ESS1.B: Earth and the Solar System
- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2)

FOSS Planetary Science
IG: pp. 374, 377, 381, 389 (E), 400 (Step 16), 405, 408-409, 411 (Step 14), 415 (F), 417 (I), 418, 420, 423, 424, 436, 439, 446-448,
SRB: pp. 69-71, 82-85, 86-96, 135
SNM: Nos. 7-13
DOR: *"Community Scale Model"*
"Tides"

Crosscutting Concepts

Systems and System Models
- Models can be used to represent systems and their interactions. (MS-ESS1-2)

FOSS Planetary Science
IG: pp. 376, 381, 384, 400, 405, 409-410, 418 (Step 18), 438, 444

FOSS Gravity and Kinetic Energy
IG: pp. 160, 179, 188, 195
SRB: pp. 31-36
TR: pp. D16, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

School Specialty. Delta Education

	FOSS Gravity and Kinetic Energy **IG:** pp. 151, 158, 161, 179, 180, 188, 195 **SRB:** pp. 31-36	

MS-ESS1-3

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS1-3

Students who demonstrate understanding can:
Analyze and interpret data to determine scale properties of objects in the solar system.
[Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.] [Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.]

FOSS Planetary Science
IG: pp. 55, 61, 63, 65, 67, 69, 73
EA: *Notebook Entry,* IG p. 260 (Item 17), IG p. 447 (Step 10), IG p. 448 (Step 14)
EA: *Performance Assessment,* IG p. 258 (Step 11), IG p. 445 (Step 5)
EA: *Review Notebook Entries*, IG p. 260 (Step 19), IG p. 304 (Step 6), IG p. 358 (Step 23), IG p. 420 (Step 22), IG p. 488 (Step 22)
BM: *Assessment Coding Guide,* pp. 22-23 (Items 1bc and 2), pp. 36-37 (Items 5 and 6), pp. 42-43 (Item 1), pp. 66-67 (Item 8), pp. 72-73 (Item 12)

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-ESS1-3)

FOSS Planetary Science
IG: pp. 444 (Step 1), 445 (Step 4),446 (Step 7), 448 (Step 13)
SRB: p. 135
TR: pp. C22-C24, C54-C59

Disciplinary Core Ideas

ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-3)

FOSS Planetary Science
IG: pp. 234, 237, 257, 260, 423, 425, 436, 439, 444, 445 (Step 3), 446, 448
SRB: p. 134
SNM: Nos. 45-46

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. Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to development of entire industries and engineered systems. (MS-ESS1-3)

FOSS Planetary Science
IG: pp. 236, 254, 255, 260, 438, 444, 445, 447, 448
TR: pp. D11, D15, D32-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS1-4

Earth's Place in the Universe

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS1-4

Students who demonstrate understanding can:
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.]

FOSS Heredity and Adaptation
IG: pp. 47, 49
EA: *Notebook Entry,* IG pp. 107-108 (Step 19)
EA: *Performance Assessment,* IG p. 100 (Step 15)
EA: *Review Notebook Entries***,** IG pp. 132-133 (Step 24)
BM: *Assessment Coding Guide,* pp. 14-15 (Item 6), pp. 34-35 (Item 3)

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)

FOSS Heredity and Adaptation
IG: pp. 88 (Step 13), 100 (Steps 14, 15), 118, 119, 120, 132
SRB: pp. 4-7, 73-77
TR: pp. C28-C31, C66-C71

FOSS Earth History
IG: 335 (step 16), 367 (step 8), 370 (step 15), 372 (step 20), 391 (step 29), 657 (step 16)

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)

FOSS Heredity and Adaptation
IG: pp. 84, 87, 95 (Steps 7, 8), 98, 99, 101, 104, 105
SRB: pp. 2-10, 73-77
DOR: *"Fossil Slideshow"*

FOSS Earth History
IG: pp. 117, 328-345, 351-359, 364-391, 655-656
SRB: pp. 45-49, 50-63, 64-67
DOR: *"Dating Rock Layers," "Fossil Evidence Puzzle Activity," "Grand Canyon Rock Correlation," "Index Fossil Correlation," "Rock Column Movie Maker," "Timeliner,"*

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)

FOSS Heredity and Adaptation
IG: pp. 99, 100 (Step 15)
SRB: pp. 5, 6, 7, 8, 9, 78-81
TR: pp. D11, D15, D32-D37

FOSS Earth History
IG: pp. 352 (step 4), 354 (step 9), 355 (step 11), 359 (step 26), 367 (step 8), 371 (step 18), 657 (step 16)

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS2-1

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-1

Students who demonstrate understanding can:
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 (e.g. rock cycle).] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]

FOSS Earth History
IG: 55, 59, 61, 65, 67, 69
EA: *Notebook Entry*, IG p. 226 (Step 26), IG p. 266 (Step 13), IG p. 451 (Step 9), IG p. 492 (Step 38)
EA: *Response Sheet***,** IG p. 238, Student Notebook Master No. 20
EA: *Performance Assessment***,** IG p. 279 (Step 9)**,** IG p. 416 (Step 3)**,** IG p. 431 (Step 11)**,** IG p. 579 (Step 19)
EA: *Review Notebook Entries***,** IG p. 239 (Step 21)**,** IG p. 302 (Step 20)**,** IG p. 453 (Step 15)**,** IG p. 517 (Step 21)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 3), pp. 30-31 (Items 1 and 3), pp. 34-35 (Item 6), pp. 36-37 (Item 9), pp. 44-45 (Item 5), pp. 48-49 (Item 3ab)

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-ESS2-1)

FOSS Earth History
IG: pp. 191, 192, 196, 197, 198, 209, 239, 263, 276, 295, 298, 302, 429, 435, 453, 547, 548, 551, 554, 653
TR: pp. C14-C17, C44-C51

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)

FOSS Earth History
IG: *pp. 179, 194 (Steps 10-11), 201 (Step 25), 209 (Step 4), 215 (Steps 16-17), 237 (Step 17), 239, 245, 254, 266-267 (Steps 13-16), 269, 281, 302, 395, 407, 420, 428, 431, 433 (Step 18), 453, 504, 578, 582-584, 592*
SRB: *pp. 20-26, 36, 88-92*
DOR: *Earth's Interior, Convection Tank, Animations: Sandstone Formation, Shale Formation, Limestone Formation*

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)

FOSS Earth History
IG: pp.472, 492, 504, 517, 536, 550, 552, 553, 555, 566, 567, 592
TR: pp. D19, D44-D45

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS2-2

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-2

Students who demonstrate understanding can:
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.]*

FOSS Earth History
IG: pp. 55, 57, 59, 61, 65, 67, 69
DOR: "Geoscenarios"
EA: *Notebook Entry,* IG pp. 195-196 (Step 14), IG p. 226 (Step 26), IG p. 266 (Step 13), IG p. 297 (Step 10), IG p. 494 (Step 15),IG p. 554 (Step 22), IG p. 564 (Step 27), IG pp. 656-657 (Step 15)
EA: *Performance Assessment*, IG p. 279 (Step 9)
EA: *Review Notebook Entries*, IG p. 162 (Step 18), IG p. 239 (Step 21), IG p. 302 (Step 20), IG p. 453 (Step 15), IG p. 517 (Step 21), IG p. 592 (Step 38)
BM: *Assessment Coding Guide,* pp. 12-13 (Items 1 and 2), pp. 18-19 (Item 7ab), pp. 22-23 (Item 2ab), pp. 28-29 (Item 8ab), pp. 30-31 (Item 2), pp. 38-39 (Item 1ab), pp. 46-47 (Item 1ab), pp. 50-51 (Item 4abc), pp. 56-57 (Item 8), pp. 58-59 (Item 10ab)

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)

FOSS Earth History
IG: pp. 196, 199, 225, 237, 239, 266, 277, 280, 298, 430, 434, 471, 492, 494, 505, 517, 548, 552, 554, 577, 578, 582, 584, 652, 653, 654, 661
TR: pp. C28-C32, C64-C73

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)

FOSS Earth History
IG: *pp. 179, 245, 299, 302,493 (Step 11), 521, 523, 534, 565 (Steps 30-31)*
SRB: *pp. 36-39, 81-87*
DOR: *"Rock Column Movie Maker", Mountain Types Slideshow, Folding, Fault Type: Convergent Boundary, Divergent Boundary, Transform Boundary*

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)

FOSS Earth History
IG: *pp.165, 183, 196 (Step 15), 201 (Step 25), 211, 215, 302, 657*
SRB: *pp. 20-26*
SNM: *Nos. 1, 10, 11, 12*
DOR: *Glen Canyon Dam High Flow Experiment Grand Canyon Flyover*

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)

FOSS Earth History
IG: pp. 182,191,209, 239, 256, 264, 296, 302, 409, 428, 472, 480, 645, 657
TR: pp. D15-D16, D32-D35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS2-3

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-3

Students who demonstrate understanding can:
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.]

FOSS Earth History
IG: pp. 55, 65, 67, 69
EA: *Notebook Entry,* IG p. 493 (Step 10) Student Notebook Master No. 32**,** IG p. 516 (Step 20)**,** IG p. 554 (Step 22)**,** IG p. 656 (Step 15)
EA: *Review Notebook Entries***,** IG p. 517 (Step 21)**,** IG p. 592 (Step 38)
BM: *Assessment Coding Guide,* pp. 34-35 (Items 5 and 7), pp. 36-37 (Item 8), pp. 38-39 (Item 1ab), pp. 42-43 (Item 3abc), pp. 44-45 (Item 4ab), pp. 46-47 (Item 2), pp. 54-55 (Item 7), pp. 56-57 (Item 9)

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)

FOSS Earth History
IG: 471, 480, 481, 482, 486, 491, 517, 535, 574, 579, 580, 592
TR: pp. C22-C24, C56-C61

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. (Secondary to MS-ESS2-3)

FOSS Earth History
IG: *pp. 505-507, 517, 526, 550 (Step 13), 551, 552 (Step 16),*
SRB: *pp. 77-78, 84*
SNM: *No. 40*

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)

FOSS Earth History
IG: *pp. 305, 455, 470, 491, 492, 493, 507, 517 (Step 21 and 22), 547 (Step 5 w/SNM No. 41), 554 (Step 21), 566, 592 (Step 39)*
SRB: *pp.46-49, 74-79, 83, 85-86*
SNM: *No. 32*
DOR: *NOAA Plate Tectonics***,** *Folding*
Fault Type:
Convergent Boundary
Divergent Boundary
Transform Boundary

Crosscutting Concepts

Patterns
- Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. (MS-ESS2-3)

FOSS Earth History
IG: pp. 472, 481, 482, 483, 486, 487, 491, 494, 517, 536, 578, 580, 592, 645, 652
TR: pp. D14, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS2-4

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-4

Students who demonstrate understanding can:
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.]

FOSS Weather and Water
IG: pp. 61, 75, 77, 556-557 (Step 12-14)
EA: *Notebook Entry***,** IG p. 527 (Step 20)**,** IG p. 565 (Step 22)
EA: *Review Notebook Entries***,** IG p. 530 (Step 26)**,** IG p. 594 (Step 15)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 4), pp. 50-51 (Item 1), pp. 54-55 (Item 4acde), pp. 56-57 (Items 5 and 6), pp. 76-77 (Items 8 and 9), pp. 78-79 (Item 10ab), pp. 80-81 (Item 11)

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)

FOSS Weather and Water
IG: pp. 484, 495, 509, 521, 526, 530, 533, 534, 545, 553, 556, 565, 594
TR: pp. C14-C17, C44-C49

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)
- Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)

FOSS Weather and Water
IG: pp. 483, 485, 486-493, 494, 497, 505 (Step 15), 509 (Step 2), 511-512 (Steps 6-9), 528 (Step 21), 529 (Step 24), 530, 533, 535, 536-538, 544, 547, 554-555 (Step 7), 564-565 (Steps 20-22), 566 (Step 24), 594
SNM: Nos. 42, 44
SRB: pp. 91-95, 123, 124-125
DOR: "Water Cycle"

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)

FOSS Weather and Water
IG: pp. 496, 510, 515, 530, 546, 556, 595
TR: pp. D17, D36-D37

MS-ESS2-5

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-5

Students who demonstrate understanding can:
Use 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.]

FOSS Weather and Water
IG: pp. 61, 65, 73, 77, 81
EA: *Notebook Entry,* IG p. 455 (Step 12), IG p. 467 (Step 17), IG p. 480 (Step 24b)
EA: *Performance Assessment,* IG p. 226 (Step 9)**,** IG pp. 679-680 (Step 20)**,** *Review Notebook Entries***,** IG p. 228 (Step 15)**,** IG p. 480 (Step 24a)
BM: *Assessment Coding Guide,* pp. 8-9 (Item 5), pp. 72-73 (Item 5ab), pp. 74-75 (Item 7), pp. 84-85 (Item 16ab)

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)

FOSS Weather and Water
IG: pp. 184, 103, 228, 659, 662-665, 679 (Step 19)
TR: pp. C18-C21, C50-C53

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)

FOSS Weather and Water
IG: pp. 183, 185, 189-190, 193, 197, 206 (Step 11), 223-225 (Steps 4-7), 228, 421, 423, 425-429, 430, 433, 453-454 (Steps 7-8), 659, 661, 666, 669, 673 (Step 1), 676 (Step 8), 680
SNM: Nos. 7, 20, 38, 39, 50
SRB: pp. 76-84, 122
DOR: "Weather Maps"

ESS2.D: Weather and Climate

- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)

FOSS Weather and Water
IG: pp. 183, 185, 193, 197, 226-227 (Step 11), 228, 659, 661, 666, 669, 680 (Step 23), 681-682 (Steps 25-27)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5)

FOSS Weather and Water
IG: pp. 195, 225, 227, 228, 432, 436, 448, 454, 463, 465, 466, 467, 668, 674, 680
TR: pp. D11, D14-D15, D24-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS2-6

Earth's Systems

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS2-6

Students who demonstrate understanding can:

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.]

FOSS Weather and Water

IG: pp. 67, 69, 77

EA: *Review Notebook Entries*, IG p. 294 (Step 16), IG p. 357 (Step 21), IG p. 594 (Step 15)

BM: *Assessment Coding Guide,* pp. 4-5 (Item 3ab), pp. 8-9 (Item 6), pp. 28-29 (Item 3abc), pp. 30-31 (Item 4ab), pp. 32-33 (Item 7), pp. 34-35 (Item 1abc), pp. 44-45 (Item 4abcd), pp. 54-55 (Item 4abcde), pp. 44-45 (Item 4abcd), pp. 58-59 (Item 7a), pp. 74-75 (Item 6 and 7), pp. 82-83 (Item 14)

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)

FOSS Weather and Water

IG: pp. 232, 243, 256, 261, 272, 273, 289, 291, 297, 298, 328, 329, 335, 337, 338, 353, 357, 587

TR: pp. C14-C17, C44-C49

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)

FOSS Weather and Water

IG: pp. 233, 237-238, 238-241, 242, 245, 261 (Step 25), 273 (Step 17), 291 (Step 9), 309

SNM: Nos. 8-10, 13

SRB: pp. 41-46, 47-50, 51-52

DOR: *Fluid Convection*

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)

FOSS Weather and Water

IG: pp. 297, 299, 300-307, 308, 311, 320 (Step 13), 328 (Step 3), 352 (Step 13), 319, 357

SRB: pp.116-117, 120-121

FOSS Weather and Water

IG: pp. 533, 535, 541-543, 569 (Step 1), 580 (Step 9), 589 (Step 10)

SRB: pp. 96-102, 103-104

DOR: *Perpetual Ocean*

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)

FOSS Weather and Water

IG: pp. 244, 290, 310, 329, 352, 594

TR: pp. D12, D16, C32-C35

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS3-1

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS3-1

Students who demonstrate understanding can:
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).]

FOSS Earth History
IG: pp. 55, 65, 69
EA: *Notebook Entry*, IG p. 623 (Step 10), IG p. 625 (Step 16)
EA: *Performance Assessment*, IG: p. 630 (Steps 4 and 5)
EA: *Review Notebook Entries*, IG p. 517 (Step 21), IG p. 633 (Steps 10-11)
BM: *Assessment Coding Guide*, pp. 8-9 (Item 5)

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)

FOSS Earth History
IG: pp. 471, 492, 494, 505, 517, 605, 623, 625, 633
TR: pp. C28-C32, C64-C73

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)

FOSS Earth History
IG: pp. 494 (TM), 597, 601, 603, 604, 607, 631, 633
SRB: pp. 99-114
DOR: *"Geoscenarios", "Timeliner"*

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. 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)

FOSS Earth History
IG: pp.472, 486, 517, 606, 623, 625, 630, 633
TR: pp. D10, D14-D15, D26-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS3-2

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS3-2

Students who demonstrate understanding can:
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).]

FOSS Earth History
IG: pp. 55, 65, 69
EA: *Notebook Entry*, IG p. 494 (Step 15), IG p. 516 (Step 20)
EA: *Performance Assessment*, IG p. 481 (Step 8)
EA: *Review Notebook Entries*, IG p. 517 (Step 21), IG p. 633 (Steps 10-11)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 4), pp. 30-31 (Item 2), pp. 46-47 (Item 1ab)

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)

FOSS Earth History
IG: pp. 471, 480, 481, 482, 486, 485, 517
TR: pp. C22-C24, C56-C61

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)

FOSS Earth History
IG: pp. 470, 479-482, 485, 486-487 (Step 26) 491-494, 517, 550 (Step 12), 565
SRB: p. 74
DOR: *"Volcano-Plotting Activity"*
"Volcanoes Around the World"
"Earthquake-Plotting Activity"
"Earthquakes around the World"
Mount St. Helens: The Eruption Impact
ShakeAlert

Crosscutting Concepts

Patterns

- Graphs, charts, and images can be used to identify patterns in data. The uses of technologies and any limitations on their use are driven by individual and 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 over time. (MS-ESS3-2)

FOSS Earth History
IG: pp. 472, 481, 482, 483, 485 (Step 24); 486 (Step 25), 487 (Step 30), 491, 494, 517
TR: pp. D14, D26-D27

MS-ESS3-3

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS3-3

Students who demonstrate understanding can:
Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

FOSS Weather and Water
IG: p. 79
EA: *Performance Assessment*, IG p. 649 (Step 6)
EA: *Review Notebook Entries,* IG p. 655 (Step 18)
BM: *Assessment Coding Guide,* pp. 60-61 (Item 2), pp. 86-86 (Item 18)

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 principles to design an object, tool, process or system. (MS-ESS3-3)

FOSS Weather and Water
IG: pp. 597, 598, 611, 630, 652, 655
TR: pp. C28-C32, C66-C67

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth, unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3)

FOSS Human Systems Interactions
***IG:** p. 111 (Step 27)*

FOSS Weather and Water
***IG:** pp. 597, 604, 605-609, 610-611, 613, 629-630 (Step 7), 649, 656*
***DOR:** "Human-Caused Sources of Carbon Dioxide*

Crosscutting Concepts

Cause and Effect

- Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)

FOSS Human Systems Interactions
IG: p. 111 (Step 27)

FOSS Weather and Water
IG: pp. 612, 629, 649, 651, 655
TR: pp. D11, D14-D15, D24-D29

MS-ESS3-4

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS3-4

Students who demonstrate understanding can:
Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
[Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

FOSS Planetary Science
IG: pp. 55, 57, 69
EA: *Performance Assessment,* IG p. 475 (Step 10) SNM No. 51
EA: *Review Notebook Entries*, IG p. 488 (Step 22)
BM: *Assessment Coding Guide,* pp. 2-3 (Item 2b), pp. 48-49 (Item 6), pp. 56-57 (Item 8)

FOSS Electromagnetic Force
IG: pp. 51, 59
EA: *Notebook Entry,* IG p. 301 (Step 27), *Performance Assessment,* IG pp. 292-293 (Step 19)
BM: *Assessment Coding Guide,* pp. 34-35 (Item 4), pp. 48-49 (Item 14)

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).
- Construct 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-ESS3-4)

FOSS Planetary Science
IG: pp. 437, 473 (Step 6), 474 (Step 8), 475 (Step 10), 476 (Step 12)
SRB: p. 104
DOR: "Earth Images Comparison Database"

FOSS Electromagnetic Force
IG: pp. 292, 300 (M)
TR: pp. C33-C38, C72-C73

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4)

FOSS Planetary Science Module
IG: pp. 436, 439, 473-488, 473, 474, 475, 476 (Step 13), 477, 478, 480 (B), 481 (D), 485 (L), 486 (N), 487, 488
SRB: p. 166
SNM: No. 51
DOR: *"World Population"*
"Earth Images Comparison Database"

FOSS Electromagnetic Force
IG: pp. 259, 266, 285 (Step 2), 288, 289, 291 (Steps 16-17), 292 (Step 22)
SRB: pp. 54-55, 62

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-4)

FOSS Planetary Science
IG: pp. 438, 475, 477, 482, 483 (H), 486 (N), 488
SRB: pp. 97-104

FOSS Electromagnetic Force
IG: pp. 292
TR: pp. D10, D14, D22-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ESS3-5

Earth and Human Activity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ESS3–5

Students who demonstrate understanding can:
Investigate factors that have caused the rise in global temperatures over time.
[Clarification Statement: Examples of factors include natural processes (such as changes in incoming solar radiation or volcanic activity) and human activities (such as fossil fuel combustion, cement production, and agricultural activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities.

FOSS Weather and Water
IG: p. 79
EA: *Review Notebook Entries*, IG p. 655 (Step 18)
BM: *Assessment Coding Guide,* pp. 8-9 (Item 7), pp. 66-67 (Item 5ab), pp. 80-81 (Item 13)

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.

- Ask questions to identify and clarify evidence of an argument. (MS-ESS3–5)

FOSS Weather and Water
IG: pp. 598, 611, 647
TR: pp. C9-C13, C42-C43

Disciplinary Core Ideas

ESS3.D: Global Climate Change

- Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3–5)

FOSS Weather and Water
IG: *pp. 597, 599, 600-609, 610-611, 613, 619 (Step 11), 627 (Step 3), 652 (Step 12), 655, 656*
SRB: *pp. 72-75, 105-110, 130-131*
DOR: *Earth's Climate over Time*
"Greenhouse-Gas Simulator"

Crosscutting Concepts

Stability and Change

- Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)

FOSS Weather and Water
IG: pp. 612, 630, 632, 655
TR: pp. D19, D40-D41

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS1-1

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-1

Students who demonstrate understanding can:
Conduct an investigation to provide evidence that living things are unicellular or multicellular and may have different cell types.
[Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.

FOSS Diversity of Life
IG: pp. 53, 57, 59, 61, 65
EA: *Performance Assessment,* IG p. 181 (Step 13), IG p. 231 (Step 8), IG p. 256 (Step 10)
EA: *Notebook Entry***,** IG pp. 638-639 (Step 11)
EA: *Response Sheet,* IG pp. 249-250 (Step 23)**,** Student Notebook Masters No. 15
EA: *Review Notebook Entries***,** IG pp. 277-278 (Step 16)**,** IG pp. 371-372 (Step 13)
BM: *Assessment Coding Guide*, pp. 2-3 (Item 2ab), pp. 10-11 (Item 2), pp. 14-15 (Item 6)

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.

- Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1)

FOSS Diversity of Life
IG: pp. 208, 210, 230, 231, 241, 242, 255, 256, 264, 277-278, 309, 310, 326, 329, 353
TR: pp. C18-C21, C50-C53

Disciplinary Core Ideas

LS1.A: Structure and Function

- All living things are made up of cells. A cell is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)

FOSS Diversity of Life
IG: pp. 207, 209, 211, 215, 218, 219, 223, 230 (Step 6), 231, 245 (Step 14), 276 (Step 12), 283, 285, 287, 289-293, 295, 299, 312, (Step 14), 344 (Step 24), 359 (Step 15),
371-372 (Step 13)
SRB: pp.14-19, 20-27, 29-30, 106-109, 110-113
SNM: Nos. 11, 15
DOR: Levels of Complexity

Crosscutting Concepts

Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

FOSS Diversity of Life
IG: pp. 220, 231, 242, 256, 276, 277-278, 296, 314, 315, 341, 372
SRB: pp. 106-109, 110-113
SNM: Nos. 7-9
TR: pp. D15-D16, D30-D31

MS-LS1-2

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-2

Students who demonstrate understanding can:
Develop and use a model to describe the function of a cell as a whole and ways parts (organelles) of cells contribute to the function.
[Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified organelle of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]

FOSS Diversity of Life
IG: pp. 53, 55, 57, 59, 61
EA: *Performance Assessment,* IG p. 201 (Step 7), IG p. 231 (Step 8)
EA: *Response Sheet,* IG pp. 317-318, Student Notebook Masters No. 29
EA: *Review Notebook Entries***,** IG pp. 277-278 (Step 16)**,** IG pp. 371-372 (Step 13)
BM: *Assessment Coding Guide,* pp. 14-15 (Item 7), pp. 16-17 (Item 9), pp.18-19 (Item 1), pp. 52-53 (Item 4), pp. 60-61 (Item 16), pp. 62-63 (Item 17)

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-LS1-2)

FOSS Diversity of Life
IG: pp. 208, 210, 220, 234, 247, 266, 277, 284, 286, 296, 315, 367, 371
TR: pp. C14-C17, C44-C49

Disciplinary Core Ideas

LS1.A: Structure and Function

- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)

FOSS Diversity of Life
IG: pp. 207, 209, 211, 212-214, 219, 223, 228 (Step 6), 232-233 (Steps 12-14), 234 (Step 16), 247 (Step 18), 266 (Step 8), 283, 277, 285, 295, 299, 328-329 (Step 6), 356 (Step 10 and 11), 366 (Step 3), 367 (Step 5), 371-372 (Step 13)
SRB: pp. 24-27, 30, 114-118
STUDENT NOTEBOOK MASTERS: Nos. 11-14, 17,18, 30, 31
DOR: *Levels of Complexity:*
"Plant Cell"
"Animal Cells"
"Bacterial Cell"
"Fungal Cell"
"Archaean Cell"
"Levels of Complexity Card Sort"

Crosscutting Concepts

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural and designed structures/systems can be analyzed to determine how they function. (MS-LS1-2)

FOSS Diversity of Life
IG: pp. 220, 231-232, 247, 248, 266, 296, 277, 328, 366
SRB: pp. 24-27, 30, 110-113
DOR: *Levels of Complexity*
TR: pp. D13, D18, D38-D39

MS-LS1-3

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-3

Students who demonstrate understanding can:
Use evidence to model how the body is a system of interacting subsystems composed of groups of cells.
[Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.] [Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.]

FOSS Human Systems Interactions
IG: pp. 43, 45, 47, 49
EA: *Performance Assessment,* IG p. 108 (Step 21), IG p. 146 (Step 13)
EA: *Response Sheet,* IG p. 135, Student Notebook Masters No. 5, IG p. 206, Student Notebook Masters No. 9
EA: *Review Notebook Entries***,** IG p. 110 (Step 25)**,** IG p. 154-155 (Step 20)**,** IG p. 247 (Step 21)
BM: Assessment Coding Guide, pp. 6-7 (Items 1-3), pp. 8-9 (Item 9), pp.10-11 (Item 7ab), pp.12-13 (Item 9), pp. 22-23 (Item 1ab), pp. 26-27 (Items 7 and 8), pp. 28-29 (Item 10)

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 evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3)

FOSS Human Systems Interactions
IG: pp. 71, 72. 81, 91, 107 (Step 20), 158, 167, 186, 206
SNM: No. 9
TR: pp. C33-C38, C66-C69

Disciplinary Core Ideas

LS1.A: Structure and Function

- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

FOSS Human Systems Interactions
IG: pp. 80, 71, 73, 83, 89-92 (Steps 6-8), 123, 134 (Step 15), 166, 169, 173 (Step 1)
SRB: pp. 3, 4-7, 8-13, 14-19, 20-25, 26-31, 32-37, 38-44, 45-49
SNM: Nos. 1-3
DOR: "Human Systems Structural Levels"
"Levels of Complexity"
"Human Cardiovascular System"

Crosscutting Concepts

Systems and System Models

- Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3)

FOSS Human Systems Interactions
IG: pp. 82, 102, 105, 127, 133, 145, 168, 199, 203, 204, 206, 228
TR: pp. D12, D16, D32-D35

MS-LS1-4

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-4

Students who demonstrate understanding can:
Use evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction.
[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.]

FOSS Diversity of Life
IG: pp. 53, 63, 65
EA: *Performance Assessment,* IG p. 472 (Step 12)
EA: *Response Sheet,* IG p. 487, Student Notebook Masters No. 54
EA: *Review Notebook Entries*, IG p. 501 (Step 13), IG p. 590 (Step 11)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 6), pp. 34-35 (Item 2ab) pp. 36-37 (Item 4), pp. 51-52 (Item 3), pp. 56-57 (Item 9)

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)

FOSS Diversity of Life
IG: pp. 438, 447, 473 (Step 15), 498, 501, 587, 590
TR: pp. C33-C38, C66-C69

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)

FOSS Diversity of Life
IG: pp. 435, 437, 439, 440, 442-445, 446-447, 451, 456-457 (Step 1), 479-480 (Step 1), 483-484 (Steps 12-13), 486-487 (Step 16), 495 (Step 1), 497 (Step 7), 499 (Step 10), 501-502 (Steps 13 and 14)
SRB: pp. 62-64, 65-72, 81-89, 122-125, 126-133
SNM: Nos. 47, 51-53, 55-56, 62, 63
DOR: *Slide Show:*
Non-flowering Plants
"Database: Pollinator Collection"
"Pollinators Game"

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-LS1-4)

FOSS Diversity of Life
IG: pp.565, 578-579, 580, 590
TR: pp. D11, D14-D15, D24-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS1-5

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-5

Students who demonstrate understanding can:

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 (photosynthesis). 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.]

FOSS Diversity of Life
IG: pp. 53, 63
EA: *Performance Assessment,* p. 472 (Step 12)
EA: *Review Notebook Entries*, IG p. 501 (Step 13)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 5), pp. 36-37 (Item 5), pp. 38-39 (Item 7), pp. 40-41 (Item 8), pp. 62-63 (Item 19)

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)

FOSS Diversity of Life
IG: pp. 435, 436, 438, 447, 460, 472, 474, 497, 501
SNM: No. 49
TR: pp. C28-C32, C66-C67

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Genetic factors as well as local conditions affect the growth of the adult plant.

FOSS Diversity of Life
***IG:** pp. 435, 437, 441-442, 446-447, 451, 468-467 (Steps 2-3), 472-473 (Step 13)*
***SRB:** pp. 58-61*
***SNM:** No. 48*

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)

FOSS Diversity of Life
IG: pp. 448, 472, 473, 501
TR: pp. D11, D14-D15, D24-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS1-6

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-6

Students who demonstrate understanding can:
Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
[Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]

FOSS Populations and Ecosystems
IG: pp. 55, 65
EA: *Notebook Entry,* IG p. 402 (Step 28)
EA: *Performance Assessment,* IG pp. 360-361 (Step 5)
EA: *Response Sheet,* IG p. 375**,** Student Notebook Master No. 19
EA: *Review Notebook Entries***,** IG p. 504 (Step 30)
BM: *Assessment Coding Guide,* pp. 4-5 (Item 2a), pp. 6-7 (Item 3ab), pp.24-25 (Item 1ab), pp. 26-27 (Items 4 and 5), pp. 30-31 (Item 7abc), pp. 68-69 (Item 9), pp.72-73 (Item 14ab), pp. 74-75 (Item 15)

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-LS1-6)

FOSS Populations and Ecosystems
IG: pp. 351, 365, 375, 404
TR: pp. C28-C32, C64-C73

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants, algae (Including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.

FOSS Populations and Ecosystems
IG: pp. 350, 373 (Steps 6 and 7), 374, 378 (D), 381 (H), 385 (Step 1)
SNM: Nos.13, 19
SRB: pp. 51-55, 56-61

PS3.D: Energy in Chemical Processes and Everyday Life

- The chemical reaction by which plants produce complex food molecules (Sugars) requires an energy input (I.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen.

FOSS Populations and Ecosystems Module
IG: pp. 350, 363 (Steps 12 and 13), 364 (Steps 15 and 16), 366 (Step 21), 372-374 (Steps 5-7), 381 (H) 425 (Step 2)
SRB: pp. 51-55, 56-61

Crosscutting Concepts

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-6)

FOSS Populations and Ecosystems
IG: pp. 337, 352, 361, 373, 374, 395, 397, 398, 400, 404
TR: pp. D12-D13, D17, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS1-7

From Molecules to Organisms: Structure and Processes

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS1-7

Students who demonstrate understanding can:
Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
[Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]

FOSS Populations and Ecosystems
IG: pp. 55, 65
EA: *Notebook Entry*, IG p. 402 (Step 28), IG p. 404 (Steps 30-31)
EA: *Response Sheet*, IG p. 375, Student Notebook Master No. 19
EA: *Review Notebook Entries*, IG p. 504 (Step 30)
BM: *Assessment Coding Guide, pp*. 4-5 (Item 2a), pp. 6-7 (Item 3ab), pp. 24-25 (Items 1ab, 2), pp. 28-29, (Item 6abc), pp. 70-71(12), pp. 72-73 (Item 14ab), pp. 74-75 (Item 15)

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-LS1-7)

FOSS Populations and Ecosystems
IG: pp. 337, 351, 397, 398, 400, 401, 404
TR: pp. C14-C17, C44-C51

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

FOSS Populations and Ecosystems
IG: pp. 337, 350, 353, 374 (Steps 8 and 9) 395 (Step 3), 396-397 (Step 10), 402 (Steps 27 and 28)
SRB: pp. 54-55

PS3.D: Energy in Chemical Processes and Everyday Life

- Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (Secondary to MS-LS1-7)

FOSS Populations and Ecosystems
IG: pp. 337, 350, 353, 374 (Step 8), 397 (Step 10), 402 (Step 27 and 28)
SRB: pp. 54-55

Crosscutting Concepts

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

FOSS Populations and Ecosystems
IG: pp. 337, 352, 361, 373, 374, 378 (C), 395, 397, 398, 400, 404
TR: pp. D12-D13, D17, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS2-1

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS2-1

Students who demonstrate understanding can:
Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
[Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

FOSS Populations and Ecosystems
IG: pp. 55, 69
EA: *Notebook Entry,* IG p. 507 (Step 30), IG p. 541 (Step 16)
EA: *Performance Assessment*, IG p. 515 (Step 7)
EA: *Review Notebook Entries*, IG p. 543 (Step 20)
BM: *Assessment Coding Guide,* pp. 2-3 (Item 1abc), pp. 40-41 (Item 1), pp. 42-43 (Item 2), pp. 44-45 (Items 2c and 3), pp. 48-49 (Item 6), pp. 58-59 (Item 1), pp. 64-65 (Items 4 and 6), pp. 66-67 (Item 7), pp. 68-69 (Item 10), pp. 70-71 (Item 12)

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-LS2-1)

FOSS Populations and Ecosystems
IG: pp. 481, 491, 504, 505, 506, 514, 515, 531, 532, 540, 543
TR: pp. C22-C24, C56-C61

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

FOSS Populations and Ecosystems
IG: pp. 481, 490, 502 (Step 15), 504 (Step 22), 506 (Step 26), 507 (Step 29-30), 514-515 (Step 5), 533-535 (Steps 5-9), 540 (Steps 12-14), 543 (Steps 20-21)
SRB: pp. 87-96, 97-99
SNM: Nos. 9, 34-36, 40
DOR: "Milkweed Bugs: Limited", "Milkweed Bugs: Unlimited", "Ecoscenarios", *The Mono Lake Story*

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

FOSS Populations and Ecosystems
IG: 492, 498, 504, 505, 506, 507, 508, 514, 515, 516, 518, 523, 531, 532, 533, 534, 535, 540, 543
TR: pp. D10, D14-D15, D26-D31

MS-LS2-2

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS2-2

Students who demonstrate understanding can:
Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems
[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

FOSS Populations and Ecosystems
IG: pp. 55, 61, 67
EA: *Notebook Entry*, IG p. 257 (Step 12), IG p. 541 (Step 16)
EA: *Performance Assessment*, IG p. 278 (Step 6), IG pp. 441-442 (Step 24)
EA: *Response Sheet*, IG p. 459, Student Notebook Master No. 23
EA: *Review Notebook Entries*, IG p. 280 (Step 12), IG p. 477 (Step 12)
BM: *Assessment Coding Guide,* pp. 18-19 (Item 1), pp. 20-21 (Items 2-4), pp. 22-23 (Item 5), pp. 32-33 (Item 1), pp. 36-37 (Item 3), pp. 38-39 (Item 6), pp. 40-41 (Item 1), pp. 42-43 (Item 2), pp. 46-47 (Item 5), pp. 48-49 (Item 6), pp. 54-55 (Item 5), pp. 60-61 (Item 2), pp. 62-63 (Item 3), pp. 66-67 (Item 8), pp. 70-71 (Item 13), pp. 74-75 (Item 15)

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 an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

FOSS Populations and Ecosystems
IG: pp. 407, 417, 443, 458, 459, 534, 535, 540, 541,542, 543, 589
TR: pp. C28-C32, C64-C73

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

FOSS Populations and Ecosystems
***IG:** pp. 242, 262 (Step 2-6), 319, 416, 442 (Step 28) 443 (Step 29-30), 459 (Steps 19-20) 540, 541, 543, 589 (Step 10)*
***SRB:** pp.76, 97-99*
***DOR:** The Mono Lake Story, "Mono Lake Food Web", Hawaii: Strangers in Paradise*

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

FOSS Populations and Ecosystems
IG: pp.244, 265, 266, 277, 280, 418, 440, 443, 452, 469, 532, 533, 560
TR: pp. D14, D26-27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS2-3

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS2-3

Students who demonstrate understanding can:
Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]

FOSS Populations and Ecosystems
IG: pp. 55, 61, 67
EA: *Notebook Entry*, IG p. 257 (Step 12), IG p. 318 (Step 11), IG p. 474 (Steps 7-8*)*
EA: *Performance Assessment***,** IG p. 278 (Step 6)**,** IG pp. 441-442 (Step 24)
EA: *Response Sheet*, IG p. 270, Student Notebook Master No. 8, IG p. 459, Student Notebook Master No. 23
EA: *Review Notebook Entries***,** IG p. 280 (Step 12)**,** IG p. 477 (Step 12)
BM: *Assessment Coding Guide*, pp. 18-19 (Item 1), pp. 20-21 (Item 2), pp. 24-25 (Item 1), pp. 26-27 (Item 4), pp. 30-31 (Item 7), pp. 32-33 (Item 1), pp. 34-35 (Item 2), pp. 36-37 (Items 3-5), pp. 38-39 (Item 6), pp. 60-61 (Item 2), pp. 62-63 (Item 3), pp. 68-69 (Item 9), pp. 72-73 (Item 14), pp. 74-75 (Item 15)

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 phenomena. (MS-LS2-3)

FOSS Populations and Ecosystems
IG: pp. 265, 266, 269, 270, 278, 280, 318, 321, 334, 397, 398, 400, 401, 404, 438, 439, 442, 443, 453, 455, 456, 458, 459, 469, 477
TR: pp. C14-C17, C44-C51

Disciplinary Core Ideas

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems
- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

FOSS Populations and Ecosystems
***IG:** pp.229, 266-267 (Steps 8-12), 280, 318 (Step 12), 321 (Step 22), 407, 416, 442 (Step 28), 443-444 (Steps 30-31), 451-454 (Steps 1-7), 474 (Step 6), 475 (Steps 8-9), 477 (Steps 12-13*
***SRB:** pp. 35-40, 70-74, 75-82, 83-86*
***SNM:** No. 8*
***DOR:** The Mono Lake Story*
"Mono Lake Food Web"

Crosscutting Concepts

Energy and Matter
- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

FOSS Populations and Ecosystems
IG: pp. 265, 267, 269, 278, 424, 427, 429, 435, 442, 451, 452, 453,458, 460, 469, 473, 474, 475, 477
TR: pp. D12-D13, D17, D38-D43

MS-LS2-4

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS2-4

Students who demonstrate understanding can:
Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. *[Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]*

FOSS Populations and Ecosystems
IG: pp. 55, 63, 67, 69, 71, 73
EA: *Notebook Entry*, IG p. 596 (Step 9)
EA: *Performance Assessment*, IG p. 589 (Step 10)
EA: *Review Notebook Entries*, IG p. 334 (Step 17), IG p. 477 (Step 12), IG p. 543 (Step 20), IG p. 604 (Step 14)
BM: *Assessment Coding Guide,* pp. 32-33 (Item 1bc), pp. 46-47 (Item 5ab), pp. 48-49 (Item 6), pp. 52-53 (Items 2-4), pp. 54-55 (Items 5 and 6), pp. 56-57 (Item 7), pp. 62-63 (Item 3c), pp. 66-67 (Item 8), pp. 68-69 (Item 11)

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).

- Construct 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-LS2-4)

FOSS Populations and Ecosystems
IG: pp. 589, 604, 635, 636, 637, 642, 648
TR: pp. C33-C38, C72-C73

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)

FOSS Populations and Ecosystems
IG: pp. 481, 532-533, 540, 541, 543, 547, 557-558, 561, 586, 587 (Step 4), 594-596 (Steps 3-9), 607, 614, 644-646
SRB: pp. 100-107, 118-119
SNM: No. 44
DOR: *The Mono Lake Story, Hawaii: Strangers in Paradise*

Crosscutting Concepts

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4)

FOSS Populations and Ecosystems
IG: pp. 534, 535, 540, 541, 542, 543, 571, 586, 588, 589, 598, 635, 636, 637
TR: pp. D19, D44-D45

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS2-5

Ecosystems: Interactions, Energy, and Dynamics

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS2-5

Students who demonstrate understanding can:
Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
[Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

FOSS Populations and Ecosystems
IG: 55, 71, 73
EA: *Notebook Entry*, IG p. 582 (Step 22), IG p. 596 (Step 9)
EA: *Performance Assessment*, IG p. 627 (Step 10), IG p. 642 (Step 4)
EA: *Review Notebook Entries*, IG p. 604 (Step 14)
BM: *Assessment Coding Guide,* pp. 50-51(Item 1ab), pp. 52- 53 (Item 3), pp. 54-55 (Item 6), pp. 64-65 (Items 4 and 5), pp. 66-67 (Item 8)

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).

- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

FOSS Populations and Ecosystems
IG: pp. 607, 615, 635, 636, 637, 642, 648
TR: pp. C33-C38, C72-C73

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)

FOSS Populations and Ecosystems
IG: pp. 547, 557, 570 (Step 14), 571-572 (Steps 16-17), 581(I), 582 (Steps 21-22),
SRB: pp. 100-101
SNM: Nos. 42, 43
DOR: *Hawaii: Strangers in Paradise*

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (Secondary to MS-LS2-5)

FOSS Populations and Ecosystems
***IG:** pp. 557-558, 594-595, 596 (Step 9), 604, 607, 614, 623 (Step 2), 624, 642*
***SRB:** pp.102-105, 118-122*
***SNM:** Nos. 6, 20*

Crosscutting Concepts

Stability and Change

- Small changes in one part of a system might cause large changes in another part. The use 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. Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

FOSS Populations and Ecosystems
IG: pp. 560, 571, 588, 589, 595, 598, 604, 616, 635, 636, 637, 642, 648
TR: pp. D19, D44-D45

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS3-1

Heredity: Inheritance and Variation of Traits

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS3-1

Students who demonstrate understanding can:
Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
[Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.]
[Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.]

FOSS Heredity and Adaptation
IG: pp. 47, 51, 53
EA: *Notebook Entry,* IG p. 272 (Step 17), IG p. 293 (Step 13)
EA: *Response Sheet,* IG p. 293, Student Notebook Master No. 19**, I**G p. 207, Student Notebook Master No. 9
EA: *Review Notebook Entries***,** IG pp. 229 (Step 19)
BM: *Assessment Coding Guide*, pp. 4-5 (Item 3), pp.16-17 (Item 1), pp. 24-25 (Item 1), pp. 26-27 (Item 3), pp. 28-29 (Item 6), pp. 36-37 (Item 5), pp. 42-43 (Item 9)

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-LS3-1)

FOSS Heredity and Adaptation
IG: pp. 203, 245, 254
SRB: pp. 26-27
TR: pp. C14-C17, C46-C51

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. (MS-LS3-1)

FOSS Heredity and Adaptation
IG: pp. 150, 153, 181, 186-189, 190, 196, 197, 229, 280, 281, 294, 295
SRB: pp. 22-27
DOR: "Heredity Slideshow"

LS3.B: Variation of Traits

- Genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)

FOSS Heredity and Adaptation
IG: pp. 244, 247, 251, 252, 253, 254
SRB: pp. 39, 49, 50, 51, 52
SNM: No. 12

Crosscutting Concepts

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function. (MS-LS3-1)

FOSS Heredity and Adaptation
IG: pp. 196 (G), 265 (H), 269 (L)
SRB: pp. 26-27, 47, 49, 51
TR: pp. D18, D44-D47

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS3-2

Heredity: Inheritance and Variation of Traits

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS3-2

Students who demonstrate understanding can:
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 (mitosis, meiosis, and binary fission).]

FOSS Diversity of Life
IG: pp. 53, 63, 537 (Step 7), 548 (Step 12)
EA: *Notebook Entry*, IG p. 530 (Step 23), IG p. 547 (Step 10)
EA: *Review Notebook Entries,* IG p. 550 (Step 16)
BM: *Assessment Coding Guide*, pp. 8-9 (Item 7), pp. 36-37 (Item 5), pp. 42-43 (Items 1 and 2), pp. 44-45 (Items 3 and 4), pp. 46-47 (Item 6), pp. 56-57 (Item 9)

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)

FOSS Diversity of Life
IG: pp. 506, 515, 535, 550
SNM: Nos. 59, 60
TR: pp. C14-C17, C44-C49

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)

FOSS Diversity of Life
IG: pp. 505, 507, 508-510, 514, 517, 521-522 (Steps 1-2), 525 (Steps 10-12), 526 (Step 14), 530 (Step 22), 549 (Steps 14-15), 550, 551 (Step 17)
SRB: pp. 73-80
DOR: *Genes and Heredity*

LS3.A: Inheritance of Traits

- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes inherited. (MS-LS3-2)

FOSS Diversity of Life
IG: pp. 505, 507, 508-513, 514, 517, 527 (Step 15), 535-536 (Step 5), 549 (Steps 14-15), 550
SRB: pp. 73-80
DOR: *Genes and Heredity*

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. (MS-LS3-2)

FOSS Diversity of Life
IG: pp. 505, 507, 510-513, 514, 517, 527 (Steps 15-16), 547-548 (Step 11), 549 (Steps 14-15), 550
SRB: pp. 73-80
SNM: Nos. 59, 60
DOR: *Genes and Heredity*

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

FOSS Diversity of Life
IG: pp. 516, 528, 529, 536, 550
TR: pp. D11, D14-D15, D24-D29

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS4-1

Natural Selection and Adaptations

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-1

Students who demonstrate understanding can:
Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
[Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.] [Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.]

FOSS Heredity and Adaptation
IG: pp. 47, 49
EA: *Notebook Entry,* IG p. 107 (Step 19)
EA: *Performance Assessment,* IG p. 95 (Step 6)**,** IG p. 99 (Step 13)
EA: *Response Sheet,* IG p. 130**,** Student Notebook Master No.4
EA: *Review Notebook Entries***,** IG pp. 132-133 (Step 24)

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-LS4-1)

FOSS Heredity and Adaptation
IG: pp. 73, 85, 94, 98, 103 (B), 116, 118, 123, 132
SRB: pp. 8-11, 73-77
TR: pp. C22-C24, C54-C59

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity

- The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1)

FOSS Heredity and Adaptation
IG: pp. 73, 75, 87, 93 (Step 3), 94 (Step 4), 95 (Steps 6-7), 96 (Step 10), 115 (Step 2), 132
SRB: pp. 2-10, 73-77
SNM: Nos. 1-2
DOR: *"Biodiveristy Slideshow"*
"Fossil Slideshow"
Fish with Fingers
Great Transitions: The Origin of the Tetrapods

Crosscutting Concepts

Patterns

- Graphs, charts, and images can be used to identify patterns in data. Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS4-1)

FOSS Heredity and Adaptation
IG: pp. 86, 98, 118, 132
SRB: pp. 8-9, 73-77
TR: pp. D9, D13, D22-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS4-2

Natural Selection and Adaptations

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-2

Students who demonstrate understanding can:
Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
[Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures (examples could include bone structure comparisons of different organisms).]

FOSS Heredity and Adaptation
IG: pp. 47, 49, 51
EA: *Notebook Entry,* IG p. 175 (Step 28) Student Notebook Master No. 7
EA: *Performance Assessment,* IG p. 119 (Step 11)
EA: *Response Sheet,* IG p. 130**,** Student Notebook Master No. 4
EA: *Review Notebook Entries***,** IG pp. 132-133 (Step 24)**,** IG pp. 229 (Step 19)
BM: *Assessment Coding Guide*, pp. 8-9 (Item 7), pp. 12-13 (Item 4ab), pp. 14-15 (Item 7), pp. 20-21 (Item 4abc), pp. 30-31 (Item 9), pp. 34-35 (Item 2)

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 to construct an explanation for real-world phenomena, examples, or events. (MS-LS4-2)

FOSS Heredity and Adaptation
IG: pp. 85, 87, 117 (Step 8), 118, 119, 120, 131, 132
SRB: p. 15
TR: pp. C28-C31, C66-C71

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity

- Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2)

FOSS Heredity and Adaptation
IG: pp. 84, 87, 119, 124 128, 129, 132, 167-169 (Steps 11-14), 175 (Step 27)
SRB: pp. 11-16, 78-81
SNM: Nos. 3-4
DOR: *Fish with Fingers*
Great Transitions: The Origin of the Tetrapods

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS4-2)

FOSS Heredity and Adaptation
IG: pp. 86, 98, 118, 120, 122, 123, 132, 152, 169, 175
SRB: pp. 17-21
TR: pp. D9, D13, D22-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS4-3

Biological Evolution: Unity and Diversity

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-3

Students who demonstrate understanding can:
Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
[Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures (examples may include fish, pigs, and chickens).] [Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.]

FOSS Heredity and Adaptation
IG: pp. 47, 51
EA: *Notebook Entry,* IG p. 174 (Step 26)**,** IG p. 175 (Step 28)
EA: *Performance Assessment,* IG p. 173 (Step 22)
EA: *Review Notebook Entries***,** IG pp. 229 (Step 19)
BM: *Assessment Coding Guide,* pp. 22-23 (Item 5)**,** pp. 32-33 (Item 1)

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 displays of data to identify linear and nonlinear relationships. (MS-LS4-3)

FOSS Heredity and Adaptation
IG: pp. 151, 174 (Step 23), 175 (Step 28)
SRB: pp. 17-21
TR: pp. C22-C24, C54-C59

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity

- Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully formed anatomy. (MS-LS4-3)

FOSS Heredity and Adaptation
IG: pp. 150, 173 (Steps 21-22), 174 (Step 26)
DOR: *"Cladogram"*
TM: T

Crosscutting Concepts

Patterns

- Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-3)

FOSS Heredity and Adaptation
IG: pp. 174 (Step 23), 175 (Step 28)
SRB: pp. 17-21
TR: pp. D9, D13, D22-D27

MS-LS4-4

Natural Selection and Adaptations

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-4

Students who demonstrate understanding can:
Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
[Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.]

FOSS Heredity and Adaptation
IG: pp. 47, 53
EA: *Notebook Entry,* IG p. 217 (Step 12) Student Notebook Masters Nos. 10-11**,** IG p. 272 (Step 17)
EA: *Performance Assessment,* IG p. 207 (Step 9)
EA: *Response Sheet,* IG p. 207**,** Student Notebook Master No. 9, IG p. 293, Student Notebook Master No. 19
BM: *Assessment Coding Guide,* pp. 4-5 (Item 3), pp. 24-25 (Item 1), pp. 26-27 (Item 4), pp. 28-29 (Item 5), pp. 30-31 (Items 7-9)**,** pp. 36-37 (Item 6), pp. 38-39 (Item 7)

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 an explanation that includes qualitative or quantitative relationships between variables that describe phenomena. (MS-LS4-4)

FOSS Heredity and Adaptation
IG: pp. 151, 207 (Step 9), 226 (H), 229, 233, 234, 286 (B), 294-296
SRB: pp. 28-31, 47-50, 60-68
TR: pp. C28-C31, C66-C71

Disciplinary Core Ideas

LS4.B: Natural Selection

- Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4)

FOSS Heredity and Adaptation
IG: pp. 150, 203, 213 (Step 3), 217 (Step 13), 229, 233, 235, 251 (Step 2), 264 (G), 266 (I), 270 (M), 272 (Step 18), 278 (Step 1), 280 (Step 5), 292 (Step 13), 295
SNM: No. 17
DOR: ***"****A Model for Predicting Genetic Variation"*
"Larkey Impossible Traits"
"Larkey Punnett Squares"
*"Walking Sticks****"***
SRB: pp. 28-32, 49-51, 53-54

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-LS4-4)

FOSS Heredity and Adaptation
IG: pp. 152, 214, 217, 222 (C), 229, 253, 255, 267 (J), 269 (L), 271, 272, 280, 292, 295
SRB: pp. 33-35
TR: pp. D10, D14, D22-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-LS4-5

Natural Selection and Adaptations

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-5

Students who demonstrate understanding can:
Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. *[Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]*

FOSS Heredity and Adaptation
IG: pp. 47, 53
EA: *Notebook Entry,* IG p. 306 (Step 9)
EA: *Performance Assessment,* IG p. 304 (Step 5)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 6), pp. 42-43 (Item 10ab), pp. 24-25 (Item 11abc)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in 6-8 builds from K-5 experiences and progresses to specifying relationships between variables and clarifying arguments and models.

- Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-LS4-5)

FOSS Heredity and Adaptation
IG: pp. 245, 305
SRB: pp. 84-88

Disciplinary Core Ideas

LS4.B: Natural Selection

- In *artificial* selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring. (MS-LS4-5)

FOSS Heredity and Adaptation
IG: pp. 218 (Step 14), 244, 247, 302 (Step 2), 304
SRB: pp. 40, 84-88
DOR: *"Genetic Technology Resources"*

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. 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 engineering systems. (MS-LS4-5)

FOSS Heredity and Adaptation
IG: pp. 246, 303 (Step 3), 304
SRB: pp. 84-88
TR: pp. D10, D14, D22-D31

MS-LS4-6

Natural Selection and Adaptations

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-LS4-6

Students who demonstrate understanding can:
Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
[Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.] [Assessment Boundary: Assessment does not include Hardy Weinberg calculations.]

FOSS Heredity and Adaptation
IG: pp. 47, 53
EA: *Notebook Entry,* IG pp. 294-295 (Step 17)
EA: *Performance Assessment,* IG pp. 282-283 (Steps 7-8)**,** IG p. 279 (Step 3)
EA: *Response Sheet,* IG p. 293, Student Notebook Master No. 19
BM: *Assessment Coding Guide***,** pp. 4-5 (Item 4)**,** pp. 6-7 (Item 5), pp. 24-25 (Item 2b), pp. 26-27 (Item 4), pp. 30-31 (Item 9)**,** pp. 36-37 (Items 4 and 5)**,** pp. 38-39 (Item 7b)

Science and Engineering Practices

Using Mathematics and Computational Thinking
Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.
- Use mathematical representations to support scientific conclusions and design solutions. (MS-LS4-6)

FOSS Heredity and Adaptation
IG: pp. 245, 278, 283, 287 (C), 294-295
TR: pp. C25-C27, C60-C65

Disciplinary Core Ideas

LS4.C: Adaptation
- Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population change. (MS-LS4-6)

FOSS Heredity and Adaptation
IG: pp. 280 (Step 5), 287 (C), 289 (E), 294-296
DOR: *"Walking Sticks"*
"Larkey Natural Selection"
The Making of the Fittest: Natural Selection and Adaptation
The Origin of Species: The Beak of the Finch
SRB: pp. 53-57
SNM: Nos. 13-15

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-LS4-6)

FOSS Heredity and Adaptation
IG: pp. 280, 292, 294-296
SRB: pp. 58-59
TR: pp. D10, D14, D22-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS1-1

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-1

Students who demonstrate understanding can:
Develop models to describe the atomic composition of simple molecules and extended structures.
[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.]
[Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure is not required.]

FOSS Chemical Interactions
IG: pp. 59, 77
EA: *Notebook Entry,* IG p. 574 (Step 20)**,** Student Notebook Masters Nos. 67-68
EA: *Performance Assessment***,** IG p. 588 (Step 13)
EA: *Review Notebook Entries***,** IG p. 620 (Step 20)
BM: *Assessment Coding Guide,* pp. 52-53 (Item 4)**,** pp. 54-55 (Items 6 and 7)**,** pp. 64-65 (Item 6)**,** pp. 66-67 (Items 8a and 9)

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to predict and/or describe phenomena. (MS-PS1-1)

FOSS Chemical Interactions
IG: pp. 551, 558, 559, 560, 562, 563, 574, 587, 620
TR: pp. C14-C17, C44-C51

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)

FOSS Chemical Interactions
IG: pp. 541, 543, 550, 553, 558-561, 563 (Step 11), 564 (Step15), 620
SRB: pp. 24-27, 110-117, 180-181

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-PS1-1)

FOSS Chemical Interactions
IG: pp. 552, 589, 614, 617, 620
TR: pp. D15-D16, D32-D35

MS-PS1-2

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-2

Students who demonstrate understanding can:
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
[Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]

FOSS Chemical Interactions
IG: pp. 59, 61, 63, 65, 73, 77, 79
EA: *Notebook Entry*, IG p. 147 (Step 33), IG p. 439 (Step 17), IG p. 464 (Step 19)
EA: *Performance Assessment***,** IG pp. 139-140 (Step 13)**,** IG p. 588 (Step 13)**,** IG p. 447 (Step 4)
EA: *Response Sheet***,** IG p. 619, Student Notebook Master No. 17
EA: *Review Notebook Entries***,** IG p. 147 (Step 33)**,** IG p. 198 (Step 16)**,** IG p. 255 (Step 10)**,** IG p. 464 (Steps 19)**,** IG p. 620 (Steps 20)
BM: *Assessment Coding Guide,* pp. 12-13 (Item 4), pp. 16-17 (Item 7), pp. 22-23 (Items 4 and 5), pp. 44-45 (Item 3), pp. 48-49 (Item 7), pp. 50-51 (Item 1), pp. 56-57 (Item 8), pp. 58-59 (Item 1), pp. 60-61 (Item 3), pp. 68-69 (Item 10)

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-PS1-2)

FOSS Chemical Interactions
IG: pp. 107, 115, 126 140, 147, 447, 451, 464, 487, 551, 584, 586, 616, 618
TR: pp. C22-C24, C56-C61

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-PS1-2)

FOSS Chemical Interactions
IG: pp.107, 109,117, 137 (Step 6), 140-141(Step 15), 146,147 (Step 33), 467, 448 (Step 5), 487 (Step 10), 497 (Step 14)
SRB: pp. 98-99, 132, 165-173
SNM: Nos. 2-6
DOR: "Explore Dissolving"
"Two-Substance Reactions"

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-PS1-2)

FOSS Chemical Interactions
IG: pp. 541, 550
586 (Step 7), 587 (Step 12), 588-589 (Steps 14-16), 613-614 (Step 6), 617 (Step 12), 618 (Step 16), 620
SRB: pp. 118-129, 146
SNM: Nos. 69-71
DOR: "Two-Substance Reactions"

Crosscutting Concepts

Patterns
- Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2)

FOSS Chemical Interactions
IG: pp. 107, 116,137, 140, 141, 142, 147, 164, 171, 172, 428, 447 (Step 4), 480
TR: pp. D14, D26-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS1-3

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-3

Students who demonstrate understanding can:
Gather and analyze 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.]

FOSS Chemical Interactions
IG: pp. 59, 61, 63, 65, 73, 77, 79
EA: *Think Question*, IG p. 573 (K)
EA: *Review Notebook Entries***,** IG p. 147 (Step 33)**,** IG p. 198 (Step 16)**,** IG p. 255 (Step 10)**,** IG p. 464 (Step 19)**,** IG p. 620 (Step 20)
BM: *Assessment Coding Guide,* pp. 14-15 (Item 6), pp. 52-52 (Item 5)

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)

FOSS Chemical Interactions
IG: pp. 163, 170, 172, 174, 183, 193,194, 605
TR: pp. C39-C41, C74-C77

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)

FOSS Chemical Interactions
IG: pp.107, 109,117, 137 (Step 6), 140-141(Step 15), 146,147 (Step 33), 467, 448 (Step 5), 487 (Step 10), 497 (Step 14)
SRB: pp. 3-5, 98-99, 132, 165-173
DOR: "Explore Dissolving"
"Two-Substance Reactions"

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)

FOSS Chemical Interactions
IG: pp. 541, 550
586 (Step 7), 587 (Step 12), 588-589 (Steps 14-16), 613-614 (Step 6), 617 (Step 12), 618 (Step 16), 620
SRB: pp. 118-129, 146
DOR: "Two-Substance Reactions"

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)

FOSS Chemical Interactions
IG: pp. 164, 194, 552, 561, 565
TR: pp. D18, D44-D45

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS1-4

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-4

Students who demonstrate understanding can:
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.
[Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]

FOSS Chemical Interactions
IG: pp. 59, 65, 67, 69, 73, 75
EA: *Notebook Entry*, IG p. 254 (Step 9), IG p. 312 (Step 11), IG p. 338 (Step 13), IG p. 536 (Step 14)
EA: *Performance Assessment*, IG p. 276 (Step 7), IG p. 367 (Step 8), IG p. 487 (Step 8)
EA: *Response Sheet*, IG p. 302, Student Notebook Master No. 26, IG p. 358, Student Notebook Master No. 38, IG p. 511, Student Notebook Master No. 63
EA: *Review Notebook Entries*, IG p. 255 (Step 10), IG p. 311 (Step 9), IG p. 370 (Step 15), IG. 464 (Step 19), IG. 537 (Step 15)
BM: *Assessment Coding Guide*, pp. 24-25 (Item 6), pp. 26-27 (Item 1), pp. 28-29 (Items 2 and 3), pp. 30-31 (Items 4 and 5), pp. 32-33 (Item 6), pp. 36-37 (Item 4), pp. 38-39 (Item 6), pp. 40-41 (Item 8), pp. 42-43 (Item 1), pp. 44-45 (Items 2 and 4), pp. 46-47 (Items 5 and 6), pp. 48-49 (Item 8), pp. 58-59 (Item 2), pp. 60-61 (Item 3), pp. 62-63 (Item 4), pp. 64-65 (Items 6 and 7), pp. 68-69 (Item 11)

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.
- Develop a model to predict and/or describe phenomena. (MS-PS1-4)

FOSS Chemical Interactions
IG: pp. 232, 233, 235, 241 (D), 246, 247, 255, 276, 279, 292, 302, 309, 311, 337, 339 (Step 15), 343, 344, 346, 368, 370, 488, 489, 497, 532, 533, 535
TR: pp. C14-C17, C44-C51

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)

FOSS Chemical Interactions
IG: pp. 201, 210, 233 (Step 12), 236 (Step 17), 245-247 (Steps 1-4), 255, 259, 266, 274 (Step 1), 279-280 (Step 12), 289-290 (Step 9), 291 (Step 11), 467, 478, 488-489 (Step 11), 497, 533 (Step 6), 534 (Step 10), 537
SRB: pp. 28-32, 33-39, 89-100
SNM: Nos. 17, 18, 50, 63
DOR: "Gas in a Syringe"
"Energy Transfer by Collision"
"Mixing Hot and Cold Water"
Hoar Frost
"Particles in Solids, Liquids, and Gases"
"Thermometer"

PS3.A: Definitions of Energy
- Heat refers to the energy transferred due to the temperature difference between two objects.
- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule. The details of that relationship depend on the type

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)

FOSS Chemical Interactions
IG: pp. 276, 279, 289, 290, 291, 302, 308, 311, 437, 447, 487, 497,498, 511, 525, 527, 535, 537
TR: pp. D10, D14-D15, D26-D31

	of atom or molecule and the interactions among the atoms in the material. ***FOSS Chemical Interactions*** **IG:** pp. 266, 279, (Step 12), 289 (Step 9), 311, 315, 326, 343-346 (Steps 4-11), 364 (Step 3), 365-366 (Step 5), 367 (Step 10), 368-369 (Step 12), 370 **SRB:** pp. 35-39, 46-55 **DOR:** "Energy Transfer by Collision" "Gas in a Syringe" "Energy Flow" "Mixing Hot and Cold Water" *Hoar Frost* "Particles in Solids, Liquids, and Gases" "Thermometer"	

MS-PS1-5

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-5

Students who demonstrate understanding can:
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. *[Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]*

FOSS Chemical Interactions
IG: pp. 59, 61, 65, 79
EA: *Notebook Entry*, IG p. 574 (Step 20), IG p. 648 (Step 15), Student Notebook Master No. 72
EA: *Performance Assessment*, **IG:** p. 588 (Step 13)
EA: *Response Sheet*, IG p. 619, Student Notebook Master No. 71
EA: *Review Notebook Entries*, IG p. 147 (Step 33), IG p. 255 (Step 10)
BM: *Assessment Coding Guide,* pp. 50-51 (Items 1- 3), pp. 56-57 (Item 9), pp. 63-63 (Item 5), pp. 66-67 (Item 8)

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 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-PS1-5)

FOSS Chemical Interactions
IG: pp. 551, 559, 587, 588, 589, 590, 613, 620, 635, 645, 646, 653
TR: pp. C14-C17, C44-C51

Disciplinary Core Ideas

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-PS1-5)
- The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)

FOSS Chemical Interactions
IG: pp. 541, 585-586 (Steps 5-7), 618-619 (Step 16), 620, 634, 637, 646-647 (Steps 11-12), 648
SRB: pp.118-129
SNM: Nos. 69-71

Crosscutting Concepts

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)

FOSS Chemical Interactions
IG: pp. 552, 583, 584, 585, 586, 587, 588, 589, 590, 613, 616, 617, 618, 620, 636, 647, 648, 654
TR: pp. D12-D13, D17, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS1-6

Matter and Interaction

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS1-6

Students who demonstrate understanding can
Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. *[Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance.] [Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.]*

FOSS Chemical Interactions
IG: pp. 59, 75
EA: *Performance Assessment*, IG p. 525 (Step 18)
EA: *Review Notebook Entries*, IG p. 537 (Step 15)
BM: *Assessment Coding Guide*, pp. 48-49 (Item 7)

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.

- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (MS-PS1-6)

FOSS Chemical Interactions
IG: pp. 467, 478, 479, 523 (Step 13), 524, 525, 527
SRB: pp.183-184
TR: pp. C28-C32, C64-C73

Disciplinary Core Ideas

PS1.B: Chemical Reactions

- Some chemical reactions release energy, others store energy. (MS-PS1-6)

FOSS Chemical Interactions Module
***IG:** pp. 467, 474-475, 478, 521, 523 (Steps 12-13), 524 (Step 15)*
***SRB:** p. 131*
***SNM:** No. 64*

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. (Secondary to MS-PS1-6)

FOSS Chemical Interactions
***IG:** pp. 478, 524-527 (Steps 15-26)*
***SRB:** pp.183-184*
***SNM:** no. 65*

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 the characteristics may be incorporated into the new design. (Secondary to MS-PS1-6)
- 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. (Secondary to MS-PS1-6)

FOSS Chemical Interactions Module
***IG:** pp. 478, 524-527 (Steps 15-26)*
***SRB:** pp.183-184*
***SNM:** No. 65*

Crosscutting Concepts

Energy and Matter

- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)

FOSS Chemical Interactions
IG: pp. 480, 527, 531, 532, 534, 535, 537
DOR: "Energy Flow"
TR: pp. D12-D13, D17, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS2-1

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS2-1

Students who demonstrate understanding can:
Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
[Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.] [Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.]

FOSS Gravity and Kinetic Energy
IG: pp. 49, 55, 57
EA: *Notebook Entry,* IG p. 253 (Step 16)
EA: *Performance Assessment,* IG p. 277 (Step 20)
EA: *Review Notebook Entries***,** IG p. 254 (Step 18)
BM: *Assessment Coding Guide,* pp. 6-7 (Item 5), pp. 26-27 (Item 5), pp. 36-37 (Item 7ab), pp. 40-41 (11ab)

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 an object, tool, process or system. (MS-PS2-1)

FOSS Gravity and Kinetic Energy
IG: pp. 265, 274, 275, 276, 279, 287 (Step 29)
SRB: pp. 56,62, 71
TR: pp. C28-C31, C66-C71

Disciplinary Core Ideas

PS2.A: Forces and Motion

- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-1)

FOSS Gravity and Kinetic Energy
IG: pp. 199, 206, 209, 242 (Step 2), 244, 245, 249, 264, 267, 271, 272 (Step 3), 279 (Step 23), 280 (Step 25), 287 (Step 28), 290-293
SRB: pp. 47-49, 57-62
SNM: No. 17
DOR: *Understanding Car Crashes-It's Basic Physics*

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 forces at different scales. (MS-PS2-1)

FOSS Gravity and Kinetic Energy
IG: pp. 208, 254, 266, 277, 278 (Step 22), 279, 290-291
SRB: pp. 52-55, 60
TR: pp. D16, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS2-2

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS2-2

Students who demonstrate understanding can:
Plan an investigation using Newton's first and Second Laws 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.
[Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]

FOSS Electromagnetic Force
IG: pp. 51, 53, 55
EA: *Notebook Entry,* IG p. 100 (Step 10), IG p. 102 (Step 15), IG p. 105 (Step 25)
EA: *Performance Assessment,* IG p. 114 (Step 7)
EA: *Response Sheet,* IG p. 126**,** Student Notebook Master No. 7
EA: *Review Notebook Entries***,** IG p. 133 (Step 29)**,** IG pp. 189-190 (Step 26)
BM: *Assessment Coding Guide,* pp. 2-3 (Items 1 and 2)**,** pp. 8-9 (Items 1 and 2)**,** pp. 14-15 (Items 7 and 8)**,** pp. 38-39 (Items 3 and 4)**,** pp. 42-43 (Item 8)

FOSS Gravity and Kinetic Energy
IG: pp. 49, 51, 53, 55, 57
EA: *Notebook Entry,* IG p. 187 (Step 20)
EA: *Performance Assessment,* IG p. 166 (Step 7)
EA: *Review Notebook Entries***,** IG p. 145 (Step 29)**,** IG p. 195 (Step 26)**,** IG p. 254 (Step 18)
BM: *Assessment Coding Guide,* pp. 2-3 (Item 1), pp. 4-5 (Item 3ab), pp. 8-9 (Items 1abcd and 2), pp. 12-13 (Items 4-6), pp. 20-21 (Item 6), pp. 24-25 (Item 1ab), pp. 26-27 (Item 4), pp. 28-29 (Item 6abc), pp. 32-33 (Items 1 and 3), pp. 34-35 (Item 4), pp. 44-45 (Item 14)

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 <u>multiple variables</u> 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-PS2-2)

FOSS Electromagnetic Force
IG: pp. 91, 99, 102, 113, 114, 133,

FOSS Gravity and Kinetic Energy
IG: pp. 150, 159, 161, 167, 183, 195, 290-291
TR: pp. C18-C21, C52-C55

Disciplinary Core Ideas

PS2.A: Forces and Motion

- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2)
- All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MS-PS2-2)

FOSS Electromagnetic Force
IG: pp. 90, 93, 105 (Step 24), 112, 114, 122 (Step 4), 125 (Step 7), 127-131, 133, 185 (Step 15)
SRB: pp. 3-7, 12-13, 15-18
SNM: Nos. 5-6
DOR: Forces

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 forces at different scales. (MS-PS2-2)

FOSS Electromagnetic Force
IG: pp. 92, 130 (C), 131 (D), 133
SRB: pp. 15-18
TR: pp. D12, D19, D46-D49

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

	FOSS Gravity and Kinetic Energy **IG:** pp. 149, 151, 158, 161, 164 (Step 2), 187 (Step 19), 179 (Step 2), 195, 290-291 **SRB:** pp. 26-30 **SNM:** No. 11	

MS-PS2-3

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS2-3

Students who demonstrate understanding can:
Interpret data to determine the factors that affect the strength of electric and magnetic forces.
[Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.]

FOSS Electromagnetic Force Model
IG: pp. 51, 55, 57
EA: *Notebook Entry,* IG p. 158 (Step 18), IG p. 188 (Step 25), IG p. 240 (Step 18)
EA: *Performance Assessment,* IG p. 185 (Step 14), IG p. 249 (Step 10)
EA: *Response Sheet,* IG p. 168, SNM No. 8
EA: *Review Notebook Entries*, IG p. 189 (Step 26), IG p. 252 (Step 16)
BM: *Assessment Coding Guide,* pp.4-5 (Item 3), pp. 18-19 (Item 6), pp. 20-21 (Item 7), pp. 22-23 (Items 8 and 9), pp. 26-27 (Item 4), pp.42-43 (Item 7)

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in grades 6–8 builds from grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

- Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3)

FOSS Electromagnetic Force
IG: pp. 203, 230, 236, 251
TR: pp. C9-C14, C42-C45

Disciplinary Core Ideas

PS2.B: Types of Interactions

- Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3)

FOSS Electromagnetic Force
IG: pp. 146, 149, 155, 156 164, 165, 167,168 (Step 17), 187, 251 (Step 15)
SRB: pp. 19-24, 38-41
DOR: *Magnetism*
"Adding Magnetic Fields"
"Virtual Electromagnet"

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-3)

FOSS Electromagnetic Force
IG: pp. 148, 155, 157, 166, 189, 249, 250, 252
SRB: pp. 24, 41
TR: pp. D10, D14, D22-D31

MS-PS2-4

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS2-4

Students who demonstrate understanding can:
Use evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
[Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.] [Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.]

FOSS Gravity and Kinetic Energy
IG: pp. 49, 51
EA: *Notebook Entry,* IG p. 144 (Step 27), IG p. 187 (Step 20)
EA: *Performance Assessment,* IG p. 184 (Step 11)
EA: *Review Notebook Entries***,** IG p. 145 (Step 29)
BM: *Assessment Coding Guide,* pp. 10-11 (Item 3ab), pp. 18-19 (Items 1-3), pp. 22-23 (Item 7), pp. 32-33 (Item 2), pp. 42-43 (Item 13)

FOSS Planetary Science
IG: pp. 55, 67
EA: *Performance Assessment,* IG p. 409 (Step 13)
EA: *Review Notebook Entries,* IG p. 420 (Step 22)

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in 6–8 builds from 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.

- Construct 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 or a solution to a problem. (MS-PS2-4)

FOSS Gravity and Kinetic Energy
IG: pp. 59, 161, 180 (Step 6), 181 (Step 8), 183 (Step 13), 184, 187 (Step 20)

FOSS Planetary Science
IG: pp. 375, 409-410, 420, 543, 569, 574
SRB: pp. 80-85
TR: pp. C33-C38, C72-C73

Disciplinary Core Ideas

PS2.B: Types of Interactions

- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4)

Gravity and Kinetic Energy
IG: pp. 88, 91, 127 (Step 2), 128, 129, 145, 149, 161, 185, 188 (Step 24), 195, 290-291
SRB: pp. 18-25, 31-36
DOR: *Falling Ball Analysis Slideshow*
Falling Ball Videos
Hammer and Feather in Space

FOSS Planetary Science
IG: pp. 374, 377, 408, 409, 411 (Step 14), 415, 417 (I), 420, 542, 569
SRB: pp. 80-85, 110-120
DOR: *"Origin of the Moon"*
Tides

Crosscutting Concepts

Systems and System Models

- Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems. (MS-PS2-4)

FOSS Gravity and Kinetic Energy
IG: pp. 90, 132, 137, 145, 160, 179, 188, 195, 291
SRB: pp. 18-25

FOSS Planetary Science
IG: pp. 376, 405, 410
SRB: pp. 80-85
TR: pp. D16, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS2-5

Motion and Stability: Forces and Interactions

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS2-5

Students who demonstrate understanding can:
Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
[Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically charged strips of tape, and electrically charged pith balls. Examples of investigations could include first-hand experiences or simulations.] [Assessment Boundary: Assessment is limited to electric and magnetic fields and is limited to qualitative evidence for the existence of fields.]

FOSS Electromagnetic Force
IG: pp. 51, 55, 57
EA: *Notebook Entry,* IG p. 158 (Step 18), IG p. 240 (Item 18)
EA: *Performance Assessment,* IG p. 185 (Step 14)**,** IG p. 249 (Step 10)
EA: *Response Sheet,* IG p. 168 (Step 19), Student Notebook Master No. 8
EA: *Review Notebook Entries***,** IG p. 189 (Step 26)**,** IG p. 252 (Step 16)
BM: *Assessment Coding Guide,* pp. 4-5 (Item 3), pp. 16-17 (Items 2 and 3), pp. 18-19 (Items 4 and 6), pp. 20-21 (Item 7ab), pp. 22-23 (Item 9), pp. 26-27 (Item 4), pp. 28-29 (Item 6), pp. 30-31 (Item 7), pp. 40-41 (Item 6), pp. 42-43 (Items 7 and 8)

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 <u>multiple variables</u> and provide evidence to support explanations or design solutions.

- Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation. (MS-PS2-5)

FOSS Electromagnetic Force
IG: pp. 147, 183, 184, 185, 189, 203, 247
TR: pp. C18-C21, C52-C55

Disciplinary Core Ideas

PS2.B: Types of Interactions

- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5)

FOSS Electromagnetic Force
IG: pp. 146, 149, 155, 164, 165, 187, 189
SRB: pp. 19-24, 40
DOR: *"Adding Magnetic Fields"*

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-5)

FOSS Electromagnetic Force
IG: pp. 148, 155, 157, 166, 189, 204, 249, 250
TR: pp. D10, D14, D22-D31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS3-1

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS3-1

Students who demonstrate understanding can:
Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and/or the speed of an object.
[Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a whiffle ball versus a tennis ball.]

FOSS Gravity and Kinetic Energy
IG: pp. 49, 55
EA: *Notebook Entry,* IG p. 237 (Step 16), IG p. 253 (Step 16)
EA: *Performance Assessment,* IG pp. 217-218 (Step 12)
EA: *Review Notebook Entries***,** IG p. 254 (Step 18)
BM: *Assessment Coding Guide,* pp. 4-5 (Item 3ab), pp. 24-25 (Item 2), pp. 28-29 (Items 6ab and 7), pp. 30-31 (Item 8ab), pp. 36-37 (Item 7ab), pp. 38-39 (Item 9), pp. 42-43 (Item 12)

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.

- Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (MS-PS3-1)

FOSS Gravity and Kinetic Energy
IG: pp. 207, 218, 219, 226 (F), 235, 236, 254, 291
SRB: p. 40
TR: pp. C22-C24, C54-C59

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)

FOSS Gravity and Kinetic Energy
***IG:** pp. 206, 214-215, 216 (Step 7), 232 (Step 2), 234-237 (Steps 8-13), 254, 291*
***SRB:** pp. 37-40*
***SNM:** Nos. 15-16*

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-PS3-1)

FOSS Gravity and Kinetic Energy
IG: pp. 208, 222, 235, 236, 238, 254, 291
SRB: pp. 41-42, 49
TR: pp. D11, D15, D32-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS3-2

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS3-2

Students who demonstrate understanding can:
Using a model to describe how the different amounts of potential energy in a system changes when the object's distance changes.
[Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.] [Assessment Boundary: Assessment is limited to two objects and electric, magnetic, and gravitational interactions.]

FOSS Electromagnetic Force
IG: pp. 51, 55, 57, 59
EA: *Performance Assessment,* IG p. 185 (Step 14), *Response Sheet,* IG p. 222 (Step 16), Student Notebook Master No. 11
EA: *Review Notebook Entries*, IG p. 189 (Step 26), IG p. 252 (Step 16)
BM: *Assessment Coding Guide,* pp. 4-5 (Item 4), pp. 16-17 (Item 3), pp. 26-27 (Item 3ab), pp. 40-41 (Item 5), pp. 42-43 (Item 8)

FOSS Gravity and Kinetic Energy
IG: pp. 49, 55, 57
EA: *Notebook Entry,* IG p. 237 (Step 16)
EA: *Performance Assessment,* IG p. 217 (Step 12)
EA: *Review Notebook Entries,* IG p. 254 (Step 18)
BM: *Assessment Coding Guide*, pp. 2-3 (Item 1), pp. 24-25 (Item 3), pp. 28-29 (Item 6abc), pp. 30-31 (Item 8b), pp. 34-35 (Item 6), pp. 42-43 (Items 12 and 13)

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 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-PS3-2)

FOSS Electromagnetic Force
IG: pp. 147, 164, 167, 168, 171, 174, 185, 188, 189
SRB: pp. 20, 21, 23, 32

FOSS Gravity and Kinetic Energy
IG: pp. 209, 219, 221, 226 (F), 236, 254, 291
SRB: pp. 39-40
TR: pp. C14-C17, C46-C51

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)

FOSS Electromagnetic Force
IG: pp. 181 (Step 2), 186, 187 (Step 21), 215, 216, 217, 220, 221, 222
SRB: pp. 20, 21 32, 33, 61
DOR: *"Adding Magnetic Fields"*

FOSS Gravity and Kinetic Energy
IG: pp. 206, 214, 215 (Step 5), 218, 209, 254
SRB: pp. 37-40

PS3.C: Relationship Between Energy and Forces

- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)

FOSS Electromagnetic Force
IG: pp. 184 (Step 12), 186 (Steps 18, 19), 233-234
SRB: pp. 17-18, 37, 40-41, 45-49
SNM: No. 9

Crosscutting Concepts

Systems and System Models

- Models can be used to represent systems and their interactions—such as inputs, processes, and outputs—and energy and matter flows within systems. (MS-PS3-2)

FOSS Electromagnetic Force
IG: pp. 148, 167, 185, 188, 189, 223, 239, 249

FOSS Gravity and Kinetic Energy
IG: pp. 208, 218, 219, 221
SRB: pp. 39-40
TR: pp. D16, D38-D43

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

	FOSS Gravity and Kinetic Energy **IG:** pp. 206, 209, 220 (Step 17), 221, 222, 232 (Step 2), 242 (Step 2), 254, 291 **SRB:** pp. 37-40	

MS-PS3-3

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS3-3

Students who demonstrate understanding can:
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 (scientific principles could include the science and engineering practices or the engineering design process).] [Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.]

FOSS Weather and Water
IG: p. 79
EA: *Performance Assessment*, IG p. 408 (Step 17)
EA: *Review Notebook Entries*, IG p. 418 (Step 32)
EA: *Response Sheet,* IG p. 398, Student Notebook Masters No. 28
BM: *Assessment Coding Guide,* pp. 42-43 (Items 1 and 2), pp. 48-49 (Item 6abcde), pp. 70-71 (Item 4)

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)

FOSS Weather and Water
IG: pp. 361, 362, 371, 380, 383, 385, 398, 408, 418
TR: pp. C28-C32, C66-C67

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)

FOSS Weather and Water
***IG:** pp. 364, 365, 370, 373, 385 (Step 18), 398 (Step 16), 418*
***DOR:** "Thermometer", "Particles in Solids, Liquids, and Gases"*

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)

FOSS Weather and Water
***IG:** pp. 361, 363, 370, 373, 381 (Step 9), 408, 418*

ET1.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)

FOSS Weather and Water
***IG:** pp. 361, 367-369, 370, 373, 394-395 (Step 6), 404 (Step 3), 418*
***TM:** X, Y*

Crosscutting Concepts

Energy and Matter

- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)

FOSS Weather and Water
IG: pp. 372, 382, 385, 392, 393, 405, 406
TR: pp. D17, D36-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

	ET1.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) ***FOSS Weather and Water*** ***IG:** pp. 361, 367-369, 370, 373, 397 (Step 15), 418* ***TM:** Z*	

MS-PS3-4

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS3-4

Students who demonstrate understanding can:
Investigate 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.]

FOSS Weather and Water
IG: p. 69
EA: *Performance Assessment,* IG p. 350 (Step 9)
EA: *Review Notebook Entries***,** IG p. 357 (Step 21)
BM: Assessment Coding Guide, pp. 32-33 (Item 5 and 7)**,** pp. 34-35 (Item 1), pp. 74-75 (Item 7)

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)

FOSS Weather and Water
IG: pp. 298, 309, 348, 350, 357
TR: pp. C18-C21, C50-C53

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)

FOSS Weather and Water
***IG:** pp. 297, 299, 308, 311, 346-347 (Step 1), 357*
***SRB:** pp. 59-63*
***DOR:** "Thermometer"*
"Particles in Solids, Liquids, and Gases"

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)

FOSS Weather and Water
***IG:** pp. 299, 306-307, 308, 311, 335 (Step 17), 350, 357*
***DOR:** "Energy Transfer: Conduction, Radiation, Convection"*

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)

FOSS Weather and Water
IG: pp. 310, 329, 330, 336, 352
TR: pp. D15-D16, C30-C31

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS3-5

Energy

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS3–5

Students who demonstrate understanding can:
Construct 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.]

FOSS Weather and Water
IG: p. 69
EA: *Performance Assessment*, IG p. 350 (Step 9)
EA: *Review Notebook Entries*, IG p. 357 (Step 21)
BM: *Assessment Coding Guide,* pp. 34-35 (Item 1), pp. 70-71 (Item 4), pp. 74-75 (Item 6), pp. 76-77 (Items 8 and 9)

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)

FOSS Weather and Water
IG: pp. 322 (Step 17), 338 (Step 23), 353 (Step 14), 357 (Step 22)
TR: pp. C33-C38, C66-C69

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)

FOSS Weather and Water
IG: pp. 297, 350, 352-354 (Steps 13-15), 357, 361, 370, 378-379 (Step 1), 381-383 (Steps 9-14)

Crosscutting Concepts

Energy and Matter

- Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion). (MS-PS3–5)

FOSS Weather and Water
IG: pp. 310, 337, 350, 353, 357
TR: pp. D17, D36-D37

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS4-1

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS4-1

Students who demonstrate understanding can:
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.
[Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.]

FOSS Waves
IG: pp. 49, 51, 53,
EA: *Notebook Entry,* IG pp. 95 (Step 8), IG 97 (Step 13), IG 107-108 (Step 16), IG 138 (Step 21)
EA: *Performance Assessment,* IG pp. 107-108 (Step 16)
EA: *Response Sheet,* IG p. 110**,** Student Notebook Master No. 3
EA: *Review Notebook Entries***,** IG p. 111 (Step 24)**,** IG p. 173 (Step 29)
BM: *Assessment Coding Guide,* pp. 2-3 (Items 1 and 2ab)**,** pp. 4-5 (Items 3ab)**,** pp. 8-9 (Items 1, 2, and 4)**,** pp. 12-13 (Item 7)**,** pp. 14-15 (Item 8)**,** pp. 28-29 (Items 1-3)**,** pp. 32-33 (Item 5)

Science and Engineering Practices

Using Mathematics and Computational Thinking
Mathematical and computational thinking at the 6–8 level builds on K–5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.

- Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MS-PS4-1)

FOSS Waves
IG: pp. 87, 95, 96, 108, 114, 123, 137
SRB: p. 6
TR: pp. C25-C27, C60-C65

Disciplinary Core Ideas

PS4.A: Wave Properties

- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)

FOSS Waves
IG: pp. 86, 89, 103 (Step 4), 105 (Step 10), 106-107, 122, 125, 130, 131,132, 138, 172 (Step 25), 173
SRB: pp. 4-6, 8-9
DOR: *Standing Wave*
Big Waves
"Oscilloscope"

Crosscutting Concepts

Patterns

- Graphs and charts can be used to identify patterns in data. (MS-PS4-1)

FOSS Waves
IG: pp. 88, 96, 98, 104, 105, 108, 111, 124, 135, 136, 137, 173
SRB: pp. 4-6, 8-9
TR: pp. D9, D13, D22-D27

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-PS4-2

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS4-2

Students who demonstrate understanding can:
Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
[Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]

FOSS Waves
IG: pp. 49, 53, 55
EA: *Notebook Entry,* IG p. 173 (Step 30)*,* IG p. 220 (Step 16)*,* IG p. 239 (Step 12)
EA: *Performance Assessment,* IG p. 167 (Step 15) IG p. 237 (Steps 6-7), Student Notebook Master No. 20
EA: *Response Sheet,* IG p. 229, Student Notebook Master No. 19
EA: *Review Notebook Entries***,** IG p. 173 (Step 29)**,** IG p. 240 (Step 13)
BM: *Assessment Coding Guide***,** pp. 4-5 (Items 3 and 4)**,** pp. 16-17 (Items 1-3)**,** pp. 22-23 (Item 10), pp. 24-25 (Items 1 and 2)**,** pp. 30-31 (Item 4abc)**,** pp. 34-35 (Items 7 and 8)**,** pp. 36-37 (Items 9 and 10)

FOSS Planetary Science
IG: pp. 55, 71
EA: *Notebook Entry,* IG p. 519 (Step 18)
EA: *Review Notebook Entries***,** IG p. 528 (Step 15)
BM: *Assessment Coding Guide*, pp. 50-51 (Items 1-3), pp. 52-53 (Item 4), pp. 54-55 (Items 6 and 7), pp. 68-69 (Item 9), pp. 74-75 (Item 14)

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 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-PS4-2)

FOSS Waves
IG: pp. 123, 125, 135, 136, 177, 178, 187, 208, 266
SRB: pp. 33-41
DOR: "Refraction"
"Oscilloscope"

FOSS Planetary Science
IG: pp. 499, 507, 543, 551, 563, 564
SRB: pp. 105-109, 110-111
DOR: "Exoplanet Transit Hunt"
TR: pp. C14-C17, C46-C51

Disciplinary Core Ideas

PS4.A: Wave Properties

- A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

FOSS Waves
IG: pp. 122, 129, 161,162, 168, 169, 173
SRB: pp. 17-20
DOR: *"Oscilloscope"*

PS4.B: Electromagnetic Radiation

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)

FOSS Waves
IG: pp. 177, 186, 189, 193, 194, 196, 197, 198,

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-PS4-2)

FOSS Waves
IG: pp. 124, 168, 173, 198 (Step 17), 263
SRB: pp. 18-19, 30-31. 60-62
DOR: *Fiber Optics*

	205, 206, 208, 211-213, 226, 227, 238, 239 **SRB:** pp. 32-41 **SNM:** Nos. 7, 18, 20 **TM:** Q **DOR:** *"Refraction"* ***FOSS Planetary Science*** **IG:** pp. 498, 501, 507, 508, 509, 510, 511, 512, 513 (Step 14), 528 **SRB:** pp. 105-109 **DOR:** *"Properties of Light Slideshow"* *"Comparing Spectra"* *Hubble's Amazing Universe*	

MS-PS4-3

Waves and Their Applications in Technologies for Information Transfer

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-PS4-3

Students who demonstrate understanding can:
Evaluate how different forms of technology utilize different signals.
[Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]

FOSS Waves
IG: pp. 49, 57
EA: *Notebook Entry,* IG p. 265 (Step 13), IG p. 276 (Step 16), IG p. 290 (Step 10), IG p. 292 (Step 12)
BM: *Assessment Coding Guide*, pp. 6-7 (Item 6), pp. 24-25 (Item 3), pp. 26-27 (Items 4 and 5), pp. 38-39 (Items 12-14)

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.
- Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3)

FOSS Waves
IG: pp. 257, 282, 283, 284- 290
SRB: pp. 63-68, 69-78, 84, 85, 86
DOR: *Fiber Optics*
"Digitized Images"
TR: pp. C39-C41, C74-C79

Disciplinary Core Ideas

PS4.C: Information Technologies and Instrumentation
- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)

FOSS Waves
IG: pp. 256, 259, 265 (Step 10), 276, 280, 282, 284-289, 293
SRB: pp. 63-68, 69- 78
SNM: No. 25
DOR: *"Digitized Images"*

Crosscutting Concepts

Structure and Function
- Structures can be designed to serve particular functions. Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. Advances in technology influence the progress of science and science has influenced advances in technology. (MS-PS4-3)

FOSS Waves
IG: pp. 263, 273-275
SRB: pp. 64-65, 86
TR: pp. D18, D44-D47

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

MS-ET1-1

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ET1-1

Students who demonstrate understanding can:
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. *[Clarification Statement: This standard may be integrated into any performance standard. Ecological topics may include deforestation, overpopulation, water quality, air quality erosion, or toxic spills.]*

FOSS Waves
IG: pp. 49, 53
EA: *Notebook Entry,* IG p. 155 (Step 13), IG p. 164 (Step 9)
EA: *Performance Assessment,* IG pp. 167-168 (Steps 15-16)
EA: *Review Notebook Entries,* IG p. 173 (Step 29)
BM: *Assessment Coding Guide*, pp. 10-11 (Item 6)

FOSS Gravity and Kinetic Energy
IG: pp. 49, 57
EA: *Performance Assessment,* IG p. 277 (Step 20)
BM: *Assessment Coding Guide*, pp. 38-39 (Item 8)

FOSS Weather and Water
IG: p. 71
EA: IG p. 407 (Step 14)
BM: *Assessment Coding Guide*, pp. 48-49 (Item 6abcde)**,** pp. 85-86 (Item 17)

FOSS Chemical Interactions
IG: p. 71
EA: *Performance Assessment*, IG p. 400 (Step 6)

FOSS Populations and Ecosystems
IG: p. 73
EA: *Performance Assessment***,** IG p. 642 (Step 4)
EA: *Review Notebook Entries***,** IG p. 413 (Step 17)

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, and 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)

FOSS Waves
IG: pp. 114,123, 125, 144 (Step 1), 164 (Step 9), 168
DOR: *Tacoma Narrows Bridge Collapse 1*
Tacoma Narrows Bridge Collapse 2
Soundproof Engineering

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)

FOSS Waves
IG: pp. 122, 125, 148 (Step 8), 151 (B), 164 (Step 9), 173
SRB: pp. 13, 16, 25, 26

FOSS Gravity and Kinetic Energy

Crosscutting Concepts

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)
- 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)

FOSS Waves
IG: pp. 124, 145, 146, 147, 148, 154 (F)
SRB: pp. 12-16

TR: pp. C9-C14, C42-C45 ***FOSS Weather and Water*** **IG:** pp. 362, 371, 395 (Step 7), 406 **TR:** pp. C9-C13, C42-C43 ***FOSS Chemical Interactions*** **IG:** pp. 378, 381,389, 401, 413 **SRB:** pp.183-184 ***FOSS Populations and Ecosystems*** **IG:** pp. 615, 627, 642, 644-646, 648 **TR:** pp. C9-C13, C42-C43	**IG:** pp. 46, 264, 273 (Step 7), 277, 287 (Step 29) **SRB:** pp. 51, 61 **DOR:** *Understanding Car Crashes-It's Basic Physics* ***FOSS Weather and Water*** **IG:** pp. 361, 367-369, 370, 373, 394-395 (Step 6), 404 (Step 3), 418 ***FOSS Chemical Interactions*** **IG:** pp.373, 375, 378, 380, 383, 390 (Step 7 and 9), 398, 399 (Step 3), 400 (Step 5), 401 (Step 9), 524 (Step 15), **SRB:** pp. 56-58 **SNM:** Nos. 45-46 ***FOSS Populations and Ecosystems*** **IG:** 627 (Step 9), 633	***FOSS Gravity and Kinetic Energy*** **IG:** p. 286 **SRB:** pp. 52, 53, 55, 62 ***FOSS Weather and Water*** **IG:** pp. 407 (Steps 14-15), 409-410 (Steps 24-24), 417 (Step 30) **TM:** EE **SRB:** pp. 64-68 ***FOSS Chemical Interactions*** **IG:** pp. 401 (Step 9-10), 411 (K) **SRB:** pp. 60-63 ***FOSS Populations and Ecosystems*** **IG:** pp. 607, 610-613, 616, 623, 624, 642 (Step 4) **DOR:** "Ecoscenarios and Ecoscenario Research Center"

MS-ET1-2

Engineering and Technology

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ET1-2

Students who demonstrate understanding can:
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. *[Clarification Statement: This standard may be integrated into any performance standard. This is a continuation of the previous standard.]*

FOSS Gravity and Kinetic Energy
IG: pp. 51, 57
EA: *Notebook Entry,* IG p. 275 (Step 12), IG p. 276 (Step 14)
EA: *Performance Assessment,* IG p. 277 (Step 20)
EA: *Review Notebook Entries*, IG p. 189 (Step 26)
BM: *Assessment Coding Guide*, pp. 38-39 (Item 8)

FOSS Weather and Water
IG: p.71
EA: *Response Sheet*, IG pp. 398-399 (Step 19), Student Notebook Masters No. 28
EA: *Performance Assessment*, IG p. 408 (Step 17)
EA: *Review Notebook Entries*, IG p. 418 (Step 32)
BM: Assessment Coding Guide, pp. 48-49 (Item 6abcde), pp. 84-85 (Item 16ab)

FOSS Chemical Interactions
IG: pp. 71, 75
EA: *Notebook Entry*, IG p. 393 (Step 19)
EA: *Performance Assessment*, IG p. 400 (Step 6), IG p. 525 (Step 18)
EA: *Review Notebook Entries*, IG p. 537 (Steps 15)

FOSS Populations and Ecosystems
IG: p. 73
EA: *Notebook Entry*, IG 643 (Step 5)
EA: *Performance Assessment*, IG p. 627 (Step 10), IG p. 636 (Step 11), IG pp. 642-643 (Step 4)
EA: *Review Notebook Entries*, IG p. 604 (Step 14)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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) ***FOSS Gravity and Kinetic Energy*** **IG:** pp. 276 (Step 18), 277 **TR:** pp. C33-C38, C72-C73 ***FOSS Weather and Water*** **IG:** pp. 397 (Step 15), 406 (Step 10), 408 (Step 20)	**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) • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), ***FOSS Electromagnetic Force*** ***IG:*** *pp. 248 (Steps 4-5)* ***FOSS Gravity and Kinetic Energy*** ***IG:*** *pp. 46, 264, 275, 287 (Step 29)* ***SRB:*** *pp. 52,53, 55*	

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

TR: pp. C33-C38, C66-C69 ***FOSS Chemical Interactions*** **IG:** pp. 381, 392, 479, 525, 527 (Step 30) **SRB:** pp. 182-184 ***FOSS Populations and Ecosystems*** **IG:** pp. 607, 615, 635, 636, 637, 642, 648 **TR:** pp. C33-C38, C72-C73	***DOR:*** *Understanding Car Crashes-It's Basic Physics* ***FOSS Weather and Water*** **IG:** pp. 404 (Step 3), 406 (Step 10), 408 (Step 20), 418 **TM:** DD ***FOSS Chemical Interactions*** **IG:** pp. 377-379, 380, 390-392 (Steps 9-15), 401 (Steps 8-9), 412 (Step 16), 525 (Step 18), 526 (Step 23), **SRB:** pp. 58, 61 **SNM:** Nos. 45-46 ***FOSS Populations and Ecosystems*** **IG:** pp. 625, (Step 5), 636, 642-643 (Step 4), 646, 649	

MS-ET1-3

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ET1-3

Students who demonstrate understanding can:
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. *[Clarification Statement: This standard may be integrated into any performance standard. This is a continuation of the previous standard.]*

FOSS Waves
IG: pp. 49, 53
EA: *Notebook Entry,* IG p. 155 (Step 13), IG p. 167 (Step 14) SNM No. 6
EA: *Performance Assessment,* IG pp. 167-168 (Steps 15-16)
EA: *Review Notebook Entries*, IG p. 173 (Step 29)

FOSS Gravity and Kinetic Energy
IG: pp. 49, 57
EA: *Performance Assessment,* IG p. 277 (Step 20)
BM: *Assessment Coding Guide*, pp. 38-39 (Item 8)

FOSS Weather and Water
IG: p. 71
EA: *Review Notebook Entries*, IG p. 418 (Step 32)
BM: *Assessment Coding Guide*, pp. 48-49 (Item 6abcde), pp. 84-85 (Item 16ab)

FOSS Chemical Interactions
IG: pp. 71, 75
EA: *Performance Assessment*, IG p. 400 (Step 6), IG p. 525 (Step 18)
EA: *Review Notebook Entries*, IG p. 413 (Step 17), IG p. 537 (Step 15)

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)

FOSS Waves
IG: pp. 114, 123, 168, 172, 173
SRB: pp. 12-16
TR: pp. C22-C24, C54-C59

FOSS Weather and Water
IG: pp. 362, 371, 380, 383, 397, 406, 408
TR: pp. C22-C24, C54-C59

FOSS Chemical Interactions
IG: pp. 373, 381, 392, 400, 401, 413, 479, 523, 524, 525, 527
SRB: p. 183

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)
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)

FOSS Electromagnetic Force
IG: pp. 250-251 (Step 12), 255

FOSS Waves
IG: pp. 122, 153, 155, 164, 168 (Step 16), 172 (Steps 26-27), 173
SRB: pp. 15, 24, 83

FOSS Gravity and Kinetic Energy
IG: pp. 47, 264, 275-277 (Steps 13-18), 287 (Step 29)
SRB: pp. 50, 51

Crosscutting Concepts

IG: Investigations Guide • **TR:** Teacher Resources • **SRB:** Student *Science Resources* Book • **DOR:** Digital-Only Resources
EA: Embedded Assessment • **BM:** Benchmark Assessment • **IA:** Interim Assessment

TR: pp. C22-C24, C56-C61	**DOR:** *Understanding Car Crashes-It's Basic Physics* ***FOSS Weather and Water*** **IG:** pp. 404 (Step 3), 405 (Step 4), 406 (Steps 10-11), 408 (Step 20), 418 **TM:** DD ***FOSS Chemical Interactions*** **IG:** pp. 375, 379, 380, 401-402 (Steps 8-12), 411 (K), 412 (Step 16), 524 (Step 16), 525-526 (Steps 20, 23-24), 527 (Steps 25-26, 30) **SRB:** p. 184 **SNM:** Nos. 45-46, 65 **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) ***FOSS Waves*** **IG:** pp. 122, 151 (Step 13), 172 (Steps 26-27), 173 **SRB:** pp. 16, 23, 24, 83 ***FOSS Gravity and Kinetic Energy*** **IG:** pp. 47, 264, 275-277 (Steps 13-18), 287 (Step 29) ***FOSS Weather and Water*** **IG:** pp. 397 (Step 15), 398 (Step 17), 406 (Steps 10-11), 407 (14-16), 408 (Step 20), 418 **TM:** DD ***FOSS Chemical Interactions*** **IG:** pp. 375, 379, 380, 401-402 (Steps 8-12), 411 (K), 412 (Step 16), 524 (Step 16), 525-526 (Steps 20, 23-24), 527 (Steps 25-26, 30) **SRB:** p. 184 **SNM:** Nos. 45-46, 65	

MS-ET1-4

Engineering Design

The following FOSS program elements address the performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts indicated below. References are selected and do not reflect every possible alignment to a standard.

Performance Expectation MS-ET1-4

Students who demonstrate understanding can:
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.

FOSS Gravity and Kinetic Energy
IG: pp. 49, 57
EA: *Notebook Entry,* IG p. 277 (Step 19)*,* IG p. 279 (Step 24)
EA: *Performance Assessment,* IG p. 277 (Step 20)
BM: *Assessment Coding Guide*, pp. 38-39 (Item 8)

FOSS Waves
IG: pp. 49, 53
EA: *Notebook Entry,* IG p. 155 (Step 13), IG p. 167 (Step 14)
EA: *Performance Assessment,* IG pp. 167-168 (Steps 15-16)

FOSS Weather and Water
IG: p. 71
EA: *Review Notebook Entries***,** IG p. 418 (Step 32)
BM: *Assessment Coding Guide***,** pp. 48-49 (Item 6abcde)

FOSS Chemical Interactions
IG: pp. 71, 75
EA: *Performance Assessment*, IG p. 400 (Step 6), IG p. 525 (Step 18)
EA: *Review Notebook Entries***,** IG p. 413 (Step 17)

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)

FOSS Gravity and Kinetic Energy
IG: pp. 257, 265, 277, 279 (Step 24)
SRB: pp. 50-56, 71

FOSS Waves Module
IG: pp. 123, 161, 164, 167
TR: pp. C14-C17, C46-C51

FOSS Weather and Water
IG: pp. 362, 371, 381, 383, 385, 394, 397, 405, 408, 418
TR: pp. C14-C17, C44-C49

FOSS Chemical Interactions

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)
- Models of all kinds are important for testing solutions. (MS-ETS1-4)

Electromagnetic Force
IG: pp. 248-251

FOSS Gravity and Kinetic Energy
IG: pp. 257, 259, 264, 267, 275-276 (Step 13), 277, 287 (Step 29)
SRB: pp. 50-56
DOR: *Understanding Car Crashes-It's Basic Physics*

FOSS Waves
IG: pp. 121, 151 (C), 147,172 (Step 26-27), 173
SRB: pp. 15, 23, 83

Crosscutting Concepts

IG: pp. 381, 383, 400, 413 **SRB:** p. 183 **TR:** pp. C14-C17, C44-C51	***FOSS Weather and Water*** **IG:** pp. 397-398 (Steps 13-17), 405 (Steps 4 and 7), 406 (Steps 10-11), 407 (Steps 15-16), 408 (Steps 18-20), 418 ***FOSS Chemical Interactions*** **IG:** pp. 375, 379, 380, 401-402 (Steps 8-12), 411 (K), 412 (Step 16), 524 (Step 16), 525-526 (Steps 20, 23-24), 527 (Steps 25-26, 30) **SRB:** p. 184 **SNM:** Nos. 45-46, 65 **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) ***FOSS Electromagnetic Force*** **IG:** pp. 250-251 (Step 12), 255 **SRB:** p. 74 ***FOSS Weather and Water*** **IG:** pp. 398 (Step 17), 403-404 (Step 1), 405 (Step 4), 406 (Step 11), 407 (Steps 14-16), 408 (Step 20), 418 ***FOSS Chemical Interactions*** **IG:** pp. 375, 379, 380, 401-402 (Steps 8-12), 411 (K), 412 (Step 16), 524 (Step 16), 525-526 (Steps 20, 23-24), 527 (Steps 25-26, 30) **SRB:** p. 184 **SNM:** Nos. 45-46, 65	