GRADE 3

Forces and Interactions

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.1

Students who demonstrate understanding can:
Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

FOSS Motion and Matter
IG: pp. 49, 51, 86, 99, 101, 104, 113-119, 122, 135, 204, 250
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.

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.)

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.

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

Connections to Nature of Science

Scientific investigations use a variety of methods to address questions about the natural and material world.

- Science investigations use a variety of methods, tools, and techniques. (3-PS2-1)

FOSS Motion and Matter
IG: pp. 104-106, 136-138, 153-154 162-163, 182-184, 190-193, 227-229
SRB: pp. 8-9
SNM: No. 1

GRADE 3

Forces and Interactions

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.2

Students who demonstrate understanding can:
Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

FOSS Motion and Matter
IG: pp. 49, 51, 53, 87, 106-108, 131, 136-139, 146, 150-157, 164, 179
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.

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. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)

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.

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

Connections to Nature of Science

Scientific knowledge is obtained through a combination of observations of the natural world and inferences based on those observations.

- Science findings are based on recognizing patterns. (3-PS2-2)

FOSS Motion and Matter
IG: pp. 138 (Step 13), 144 (Step 12), 202 (Step 11)

GRADE 3

Forces and Interactions

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.3

Students who demonstrate understanding can:
Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

FOSS Motion and Matter
IG: pp. 49, 51, 87, 94-101, 105-109, 113-119, 208-210
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.

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.

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

GRADE 3

Forces and Interactions

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.4

Students who demonstrate understanding can:
Define a simple design problem that can be solved by applying scientific ideas about magnets. *

FOSS Motion and Matter
IG: pp. 49, 51, 208-211
EA: *Performance Assessment*, IG p. 200 (Step 6)
BM: pp. 28-29 (Item 6)
IA: *Physical Science Task 2—Toy Shed*
SRB: pp. 42-45

Science and Engineering Practices

Asking Questions and Defining Problems

- Define a simple problem that can be solved through the development of a new or improved object or tool.

FOSS Motion and Matter
IG: pp. 172, 175, 176, 177, 199, 209, 211
SRB: pp. 42-45
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.

FOSS Motion and Matter
IG: pp. 176, 177, 210 (Steps 11-12)
SRB: pp. 42-45

Connections to Engineering, Technology, and Applications of Science

Scientific investigations use a variety of methods to address questions about the natural and material world.

FOSS Motion and Matter
IG: p. 203 (Steps 13-14)
SRB: pp. 40-41, 42-45

GRADE 3

Forces and Interactions

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.5

Students who demonstrate understanding can:
Support an argument that the gravitational force exerted by Earth on objects is directed toward the center of the Earth.

FOSS Motion and Matter
IG: pp. 32, 42, 86, 95-101, 117-118, 122, 131, 135, 178, 202-204, 250
EA: Response Sheet IG: p. 107, SNM No. 3
BM: pp. 4-5 (Item 1b), pp. 7-8 (Item 4), pp. 16-17 (Item 8d), pp. 26-27 (Item 4a), pp. 28-29 (Item 5), pp. 32-33 (Items 1a, 1c), pp. 46-47 (Item 2a)
SRB: pp. 3-7, 10-15, 34-37

Science and Engineering Practices

Asking Questions and Defining Problems
- Define a simple problem that can be solved through the development of a new or improved object or tool.

FOSS Motion and Matter
IG: pp. 172, 175, 176, 177, 199, 209, 211
SRB: pp. 42-45
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.

FOSS Motion and Matter
IG: pp. 176, 177, 210 (Steps 11-12)
SRB: pp. 42-45

Crosscutting Concept

Cause and Effect
- Cause-and-effect relationships are routinely identified and used to explain change.

FOSS Motion and Matter
IG: pp. 97, 99, 101, 109, 114, 144, 155, 157, 165, 200, 202, 232, 242, 275

GRADE 3

Interdependent Relationships in Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.6

Students who demonstrate understanding can:
Construct an argument that some animals form groups that help members survive.

FOSS Structures of Life
IG: pp. 47, 51, 203, 244, 246, 249
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.

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. (Note: Moved from K–2.)

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.

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

GRADE 3

Interdependent Relationships in Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.7

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.

FOSS Structures of Life
IG: pp. 47, 51, 187, 189, 191, 193-194, 201, 203, 247-248 (Steps 19-20), 272
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.

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.

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.

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

GRADE 3

Interdependent Relationships in Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.8

Students who demonstrate understanding can:
Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change*

FOSS Structures of Life
IG: pp. 47, 51, 187, 260-261 (Steps 18-21), 268 (Step 14), 272
EA: IG p. 261 (Step 21)
BM: pp. 14-15 (Item 10), pp. 16-17 (Item 11), pp. 42-43 (Item 7)

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.

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.C: Ecosystem Dynamics, Functioning, and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

FOSS Structures of Life
IG: pp. 187, 260-261 (Steps 18-21), 268 (Step 14), 272
SRB: pp. 66-69
DOR: *"Where Does It Live?"*
"What Doesn't Belong?"
All About Fossils

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats, affects the organisms living there. (3-LS4-4)

FOSS Structures of Life
IG: pp. 187, 260-261 (Steps 18-21), 268 (Step 14), 272
SRB: pp. 66-69
DOR: *"Where Does It Live?"*
"What Doesn't Belong?"
All About Fossils

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions.

FOSS Structures of Life
IG: pp. 224, 267, 268, 270
TR: pp. D14-D16, D30-D31

GRADE 3

Inheritance and Variation of Traits: Life Cycles and Traits

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.9

Students who demonstrate understanding can:
Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

FOSS Structures of Life
IG: pp. 47, 49, 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
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.

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.

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.

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

Connections to the Nature of Science

Scientific knowledge is simultaneously reliable and subject to change based on empirical evidence and interpretation.
- Science findings are based on recognizing patterns. (3-LS1-1)

FOSS Structures of Life
IG: pp. 104, 117 (Step 20), 119 (Step 25), 162 (Step 17), 173
SRB: p. 12-15

GRADE 3

Inheritance and Variation of Traits: Life Cycles and Traits

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.10

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.

FOSS Structures of Life
IG: pp. 47, 49, 51, 145, 147, 149, 151, 182, 272, 279, 281, 293, 309 (Step 9), 341
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.

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.

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.

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.

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

GRADE 3

Inheritance and Variation of Traits: Life Cycles and Traits

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.11

Students who demonstrate understanding can:
Use evidence to support the explanation that traits can be influenced by the environment.

FOSS Structures of Life
IG: pp. 47, 49, 51, 187, 189, 194-195, 201, 203, 232 (Step 24), 233 (Step 26), 237 (Step 38), 272
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

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.

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.

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

GRADE 3

Inheritance and Variation of Traits: Life Cycles and Traits

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.12

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.

FOSS Structures of Life
IG: pp. 47, 51, 187, 189, 193-194, 201, 233 (Step 27), 272
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.

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.

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.

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

GRADE 3

Weather and Climate

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.13

Students who demonstrate understanding can:
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

FOSS Water and Climate
IG: pp. 49, 51, 196, 200, 202-203, 207 (Step 9), 214-215 (Steps 18-19), 256, 259, 261
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.

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.

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.

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

GRADE 3

Weather and Climate

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.14

Students who demonstrate understanding can:
Obtain and combine information to describe climates in different regions of the world.

FOSS Water and Climate
IG: pp. 47, 51, 253, 255, 256, 257, 259, 261, 272 (Step 1), 275 (Steps 11-12), 276 (Step 13)
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.

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.

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.

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

GRADE 3

Weather and Climate

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.15

Students who demonstrate understanding can:
Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. *

FOSS Water and Climate
IG: pp. 47, 51, 253, 255, 258, 259, 261, 284-285 (Steps 11-13)
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.

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.

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.

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

Connections to Nature of Science

Scientific investigations use a variety of methods to address questions about the natural and material world.

- Science affects everyday life.

FOSS Water and Climate
IG: pp. 208, 260, 284-285, 300
SRB: pp. 55-60, 61-62, 68-72, 75-76, 77-82

GRADE 3

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.16

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.

FOSS Water and Climate
IG: p. 51, 281-285, 323-328
EA: *Performance Assessment*, IG p. 325 (Step 8)

FOSS Motion and Matter
IG: p. 53, 171, 173, 177, 179, 212
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.

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.

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.

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

GRADE 3

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.17

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.

FOSS Water and Climate
IG: p. 51, 324-328
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, 171, 173, 177, 179, 212
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.

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.

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

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

- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

FOSS Structures of Life
IG: pp. 127, 338
SRB: pp. 12-15, 100-103

FOSS Water and Climate
IG: pp. 308, 318-319
SRB: pp. 63-67, 73-76, 77-82, 86-89

FOSS Motion and Matter
IG: p. 185
SRB: p. 24

GRADE 3

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.3.18

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.

FOSS Water and Climate
IG: p. 51, 291, 292, 299, 301, 325-328
EA: *Performance Assessment*, IG p. 325 (Step 8)

FOSS Motion and Matter
IG: p. 53, 171, 173, 177, 179, 212
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.

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.

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

GRADE 4

Energy

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.1

Students who demonstrate understanding can:
Use evidence to construct an explanation relating the speed of an object to the energy of that object.

FOSS Energy
IG: pp. 59, 63, 301 (Step 5), 303 (Step 11), 304 (Step 15), 314 (Step 13), 320 (Step 26), 321
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., measurements, observations, patterns) to construct an explanation.

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.

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.

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

GRADE 4

Energy

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.2

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.

FOSS Energy
IG: pp. 59, 61, 63, 123 (Step 10), 126 (Step 18), 164, 169, 271, 294-295 (Steps 13-15), 321
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.

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.

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)
- Light also transfers energy from place to place. (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. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2)

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.

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

GRADE 4

Energy

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.3

Students who demonstrate understanding can:
Ask questions and predict outcomes about the changes in energy that occur when objects collide.

FOSS Energy
IG: pp. 59, 63, 65, 303 (Step 11), 318-319 (Steps 23-25), 321, 384
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*
SRB: pp. 83-85

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.

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

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- 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.

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.

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

GRADE 4

Energy

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.4

Students who demonstrate understanding can:
Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*

FOSS Energy
IG: pp. 59, 61, 63, 65, 127-128 (Steps 19-21), 165 (Step 10), 169, 271, 293, 321, 384
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)
SRB: pp. 3-7

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.

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. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.

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

ETS1.A: Defining 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. (secondary to 4-PS3-4)

Crosscutting Concepts

Energy and Matter
- Energy can be transferred in various ways and between objects.

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

	FOSS Energy **IG:** pp. 167 (Steps 13-14), 168 (Step 15), 169, 384 **SRB:** pp. 21-24, 25-29	

Connections to Nature of Science

World Science is a Human Endeavor

- Science is a creative human endeavor which is influenced by social and cultural biases.

FOSS Energy
IG: pp. 165 (Step 7), 167 (Steps 13-14), 168 (Step 15), 269 (Step 17)
SRB: pp. 21-24, 25-29

GRADE 4

Waves: Waves and Information

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.5

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.

FOSS Energy
IG: pp. 59, 65, 341, 348-349 (Steps 10-11), 351-352 (Steps 14-16), 353-355 (Steps 19-22), 384
EA: *Notebook Entry*, IG p. 352 (Step 18)
BM: pp. 6-7 (Items 3ab)
SRB: pp. 86-90

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. (Note: This grade band endpoint was moved from K–2.) (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

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence
- Scientific knowledge is obtained through a combination of observations of the natural world and inferences based on those observations.

FOSS Energy
IG: pp. 346, 347, 351, 352, 357

GRADE 4

Waves: Waves and Information

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.6

Students who demonstrate understanding can:
Generate and compare multiple solutions that use patterns to transfer information. *

FOSS Energy
IG: pp. 59, 63, 269 (Step 17), 267-268 (Steps 13-15), 271
EA: *Notebook Entry*, IG p. 20, SNM No. 21
BM: pp. 12-13 (Item 9), pp. 50-51 (Item 9)
SRB: pp. 58-64

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.

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.

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

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. (secondary to 4-PS4-3)

FOSS Energy
IG: pp. 169, 265 (Step 5), 270 (Step 19), 271, 384

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort and classify designed products.

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

GRADE 4

Structure, Function, and Information Processing

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.7

Students who demonstrate understanding can:
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

FOSS Energy
IG: pp. 59, 65, 361 (Step 1), 363 (Step 9), 366 (Step 17), 369-370 (Steps 25-27), 384
EA: *Response Sheet*, IG p. 367, SNM No. 28
BM: pp. 8-9 (Item 5), pp. 10-11 (Item 7)
IA: *Physical Science Task 2—Hide and Seek*
SRB: pp. 106-110

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.

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

Disciplinary Core Ideas

PS4.B: Electromagnetic Radiation
- An object can be seen when light reflected from its surface enters the eyes.

FOSS Energy
IG: pp. 361 (Step 1), 363 (Step 9), 366 (Step 17), 369-370 (Steps 25-27), 384
SRB: pp. 106-110
DOR: *All About Light*

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships are routinely identified.

FOSS Energy
IG: pp. 346, 347, 351, 352, 357, 363, 371, 378
TR: pp. D10-D12, D28-D31

GRADE 4

Structure, Function, and Information Processing

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.8

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.

FOSS Environments
IG: pp. 47, 49, 51, 126 (Steps 27-28), 153, 155, 160, 163, 185 (Step 25), 262 (Step 15), 273, 311 (Steps 48-49)
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*
SRB: pp. 16-17, 91-92

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.

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.

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.

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

GRADE 4

Structure, Function, and Information Processing

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.9

Students who demonstrate understanding can:
Use a model 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.

FOSS Environments
IG: pp. 47, 49, 51, 145, 101 (Step 6), 208-209 (Step 13), 210-211 (Step 17), 212 (Steps 20-22), 215
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*
SRB: pp. 17, 48-54

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.

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.

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.

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

GRADE 4

Earth's Systems: Processes that Shape the Earth

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.10

Students who demonstrate understanding can:
Identify evidence from patterns in rock formations and fossils in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 55, 194-195 (Steps 5-6), 198-199 (Steps 16-18), 199-200 (Steps 20-23), 258
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*
SRB: pp. 23-26, 27-30

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.

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.

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.

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

Connections to the Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Scientific knowledge is simultaneously reliable and subject to change based on empirical evidence and interpretation.

FOSS Soils, Rocks, and Landforms
IG: pp. 102, 105, 127, 139, 164, 188, 244

GRADE 4

Interdependent Relationships in Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.11

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.

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 55, 193-201
EA: *Reading in Science Resources*, IG p. 198 (Steps 16-18)
BM: pp. 6 (Item 8), pp. 15 (Item 1a), pp. 16 (Item 2)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
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.

FOSS Soils, Rocks, and Landforms
IG: pp. 200
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.
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 55, 193-201
SRB: pp. 23-26, 27-30
DOR: Fossils

Crosscutting Concepts

Stability and Change
- Observable phenomena exist from very short to very long time periods.

FOSS Soils, Rocks, and Landforms
IG: pp. 195, 196
TR: pp. D12-D13, D30-D31

GRADE 4

Earth's Systems: Processes that Shape the Earth

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.12

Students who demonstrate understanding can:
Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 24, 129-130 (Steps 18-21), 131-132 (Step 23), 142, 168-169 (Steps 18-20), 181 (Step 27), 182 (Step 28), 201
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*
SRB: pp. 6-8, 9-14

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.

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.

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.

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

GRADE 4

Earth's Systems: Processes that Shape the Earth

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.13

Students who demonstrate understanding can:
Analyze and interpret data from maps to describe patterns of Earth's features.

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 53, 227 (Steps 21-23), 239 (Step 16), 240 (Step 18), 256 (Steps 9-11), 258
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)
SRB: pp. 31-33, 38-49

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.

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.

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.

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

GRADE 4

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.14

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.

FOSS Energy
IG: pp. 59, 61, 65, 163-164 (Step 3), 169, 379 (Step 13), 381, 384
EA: *Performance Assessment*, IG p. 164 (Step 4), IG p. 381 (Step 18)
BM: pp. 46-47 (Item 7)

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.

FOSS Energy
IG: pp. 163, 164, 168, 381
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.

FOSS Energy
IG: pp. 163-164 (Step 3), 169, 379 (Step 13), 381, 384

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.

FOSS Soils, Rocks, and Landforms
IG: pp. 289-290 (Steps 9-12)
SRB: pp. 60-64

FOSS Energy
IG: pp. 382-383 (Steps 22-24), 282 (Step 25)
SRB: pp. 114-119, 120-121

GRADE 4

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.15

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.

FOSS Energy
IG: pp. 59, 61, 65, 163-164 (Step 3),169, 380-381 (Step 17), 384
EA: *Performance Assessment*, IG p. 381 (Step 18)
BM: pp. 18-19 (Item 2a)

Science and Engineering Practices

Constructing Explanations and Designing Solutions
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.

FOSS Soils, Rocks, and Landforms
IG: pp. 248, 291, 296, 297

FOSS Energy
IG: p. 391
TR: pp. C23-C26, C46-C53

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.
- 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

Crosscutting Concepts

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

- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

FOSS Energy
IG: pp. 246-249
SRB: pp. 58-64, 114-118

GRADE 4

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.4.16

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.

FOSS Energy
IG: pp. 59, 61, 63, 65, 163-166, 169, 246-249, 269-270, 271, 377-381, 384
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.

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.

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

GRADE 5

Structure and Properties of Matter

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.1

Students who demonstrate understanding can:
Make observations and measurements to identify materials based on their properties.

FOSS Mixtures and Solutions
IG: pp. 49, 53, 55, 249, 258, 277 (Steps 9-10), 279 (Step 17), 284 (Step 5), 286 (Step 16), 329 (Step 3), 332 (Step 12)
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)
SRB: pp. 9 and 22

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.

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.)

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

- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

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

GRADE 5

Structure and Properties of Matter

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.2

Students who demonstrate understanding can:
Develop a model to describe that matter is made of particles too small to be seen.

FOSS Earth and Sun
IG: pp. 57, 61, 63, 239, 241, 250, 259 (Step 10), 260 (Steps 13-14), 261, 262 (Step 17), 273 (Step 14), 286 (Step 19), 290
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)
SRB: pp. 105-108, 121

FOSS Mixtures and Solutions
IG: pp. 49, 55, 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)
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*
SRB: pp. 7, 24, 26-27,32, 42-43, 75

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.

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.

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

Crosscutting Concepts

Scale, Proportion, and Quantity
- Natural objects exist from the very small to the immensely large.

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

	(Steps 4 and 6) **SRB:** pp. 7, 24, 26-27,32, 42-43, 75 **DOR:** *"Tutorial: Solutions"* *"Tutorial: Conservation of Mass"* *Changes in Properties of Matter)* *Chemical Reactions*	

GRADE 5

Structure and Properties of Matter

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.3

Students who demonstrate understanding can:
Measure and graph 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

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53, 55, 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)
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*
SRB: pp. 10, 11, 30, 31

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.

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.

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. (Boundary: Mass and weight are not distinguished at this grade level.)

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
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

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

Connections to the Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Scientific knowledge is obtained through a combination of observations of the natural world and inferences based on those observations.

FOSS Mixtures and Solutions
IG: pp. 117 (Step 15), 178, 242 (Step 16)
SRB: pp. 18-20, 38-40

GRADE 5

Structure and Properties of Matter

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.4

Students who demonstrate understanding can:
Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

FOSS Mixtures and Solutions
IG: pp. 49, 55, 307, 314-315, 325 (Step 20), 326 (Step 23), 330 (Step 7), 332 (Steps 12-13), 335 (Step 20), 341 (Step 6)
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*
SRB: pp. 74-78, 79-80

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.

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.

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.

FOSS Mixtures and Solutions
IG: pp. 316, 325, 332, 335, 341
SRB: pp. 79-80
TR: pp. D10-D12, D30-D31

GRADE 5

Matter and Energy in Organisms and Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.5

Students who demonstrate understanding can:
Support an argument that plants get the materials they need for growth chiefly from air and water.

FOSS Living Systems
IG: pp. 47, 51, 53, 171-173 (Steps 7-9), 173 (Step 11), 223 (Step 28), 225-226 (Steps 30-33)
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*
SRB: pp. 23-26, 40-42, 74, 77

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.

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 chiefly from air and water

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

FOSS Living Systems
IG: pp. 172, 173 193, 210, 229, 257, 272, 313
SRB: pp. 23 and 26

TR: pp. D19-D21, D38-D41

GRADE 5

Matter and Energy in Organisms and Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.6

Students who demonstrate understanding can:
Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

FOSS Living Systems
IG: pp. 47, 49, 51, 53, 55, 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)
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)
SRB: pp. 7, 8, 24, 26

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.

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)

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.

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

GRADE 5

Matter and Energy in Organisms and Ecosystems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.7

Students who demonstrate understanding can:
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

FOSS Living Systems
IG: pp. 49, 51, 53, 55, 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)
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*
SRB: pp. 7-10, 14-15,16, 17, 18-20, 26, 27, 29-31, 71, 74-77

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.

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. Organisms can survive only in environments in which their particular needs are met. 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.

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"

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions.

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

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

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"

Connections to the Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events. (5-LS2-1)

FOSS Living Systems
IG: pp. 114-115 (Step 26), 122, 172, 224, 241, 244, 265, 269
SRB: pp. 78-80

GRADE 5

Earth's Systems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.8

Students who demonstrate understanding can:
Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

FOSS Earth and Sun
IG: pp. 57, 63, 367, 376-377, 379, 400, 401-402, 404 (Step 14), 406 (Step 20), 422
EA: *Notebook Entry*, IG p. 406 (Step 20)
BM: pp.10-11 (Items 7ab)
SRB: p. 124

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.

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.

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
- Standard units are used to measure and describe physical quantities such as weight and volume.

FOSS Earth and Sun
IG: pp. 402, 417, 419, 422
TR: pp. D13-D15, D32-D33

GRADE 5

Earth's Systems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.9

Students who demonstrate understanding can:
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

FOSS Living Systems
IG: pp. 47, 55, 108 (Step 6), 270, 307, 309 (Step 4), 316
SRB: pp. 73, 74-80
BM: pp. 16-17 (Item 11)

FOSS Earth and Sun
IG: pp. 57, 61, 63, 295, 346, 359-360 (Steps 26-27), 361, 376-377, 421 (Step 20), 422
EA: *Notebook Entry*, IG p. 421 (Step 20)
BM: pp. 8-9 (Item 6), pp. 14-15 (Item 10), pp. 56-57 (Item 7)
SRB: pp. 144-151

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.

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.

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.

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

Connections to the Nature of Science

Science Addresses Questions About the Natural and Material World
- Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

FOSS Living Systems
IG: pp. 2, 4, 39, 248
SRB: pp. 74-80

FOSS Earth and Sun
IG: pp. 316 (Step 16), 417 (Step 11), 421 (Step 18)

GRADE 5

Earth's Systems

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.10

Students who demonstrate understanding can:
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

FOSS Living Systems
IG: pp. 49, 55, 79, 87, 106, 107 (Step 6), 108, 114 (Step 26), 115, 126 (Step 20), 137, 261, 269, 313 (Step 8), 316
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)
SRB: pp. 7-11, 74-78

FOSS Earth and Sun
IG: pp. 57, 61, 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)
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)
SRB: pp. 81-84, 85-91, 105-109, 120-123 125-129, 130-138, 139-143

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.

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.

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

Crosscutting Concepts

Systems and System Models
- A system can be described in terms of its components and their interactions.

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

GRADE 5

Energy

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.11

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.

FOSS Earth and Sun
IG: pp. 346, 359, 360, 421, 426
SRB:. pp. 110-111, 112-119
EA: pp. 421 (step 20)

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.

FOSS Earth and Sun
IG: pp. 126, 142, 180, 183, 193, 204, 208, 212, 216, 230, 232, 263, 268, 271, 280, 285, 319, 331, 332
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.

FOSS Earth and Sun
IG: pp. 346, 359, 360, 421, 426
SRB:. pp. 110-111, 112-119
EA: pp. 421 (step 20)

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.

FOSS Earth and Sun
IG: pp. 355, 367, 384, 386, 388
TR: pp. D10-D12, D28-D31

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology
- Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3-1)

FOSS Soils, Rocks, and Landforms
IG: pp. 282 (Steps 12-14) and 289 (9-11)
SRB: pp. 55-59, 60-64

GRADE 5

Earth's Systems: Processes that Shape the Earth

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.12

Students who demonstrate understanding can:
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*

FOSS Earth and Sun
IG: pp. 420, 421
EA: pp. 421 (step 20)
SRB: pp. 144-151

FOSS Soils, Rocks, and Landforms
IG: pp. 51, 55, 212-213, 217, 239 (Step 16), 240 (Step 18), 254-255 (Step 6), 258
EA: *Notebook Entry*, IG p. 255 (Step 9)
BA: pp. 14-15 (Items 9-10), pp. 50-51 (Items 7ab)

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.

FOSS Earth and Sun
IG: pp. 126, 142, 180, 183, 193, 204, 208, 212, 216, 230, 232, 263, 268, 271, 280, 285, 319, 331, 332
TR: pp. C32-C33, C56-C61

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.

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

ETS1.B: Designing Solutions to Engineering Problems
- Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)

FOSS Earth and Sun
IG: pp. 420, 421
EA: pp. 421 (step 20)
SRB: pp. 144-151

FOSS Soils, Rocks, and Landforms
IG: pp. 225, 232-235, 254-255 (Steps 6-9), 258

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships are routinely identified and used to explain change.

FOSS Earth and Sun
IG: pp. 355, 367, 384, 386, 388
TR: pp. D10-D12, D28-D31

GRADE 5

Space Systems: Stars and the Solar System

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.13

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.

FOSS Earth and Sun
IG: pp. 57, 59, 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
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*
SRB: pp. 15, 22, 48-49, 66-67, 70, 78

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.

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.

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.

FOSS Earth and Sun
IG: pp. 168, 181, 188, 189, 190, 191, 194, 233
TR: pp. D13-D15, D32-D33

GRADE 5

Space Systems: Stars and the Solar System

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.14

Students who demonstrate understanding can:
Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

FOSS Earth and Sun
IG: pp. 57, 59, 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)
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*
SRB: pp. 3-7, 10-13, 34-35

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.

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.

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.

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

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

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.15

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.

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53, 96, 127 (Step 6), 127 (Step 9), 132 (Step 21), 297 (Steps 16-21), 301 (Step 29)
EA: *Notebook Entry,* IG p. 298 (Step 21)
BM: pp. 4-5 (Item 3a)

FOSS Earth and Sun
IG: pp. 352-361
EA: *Performance Assessment,* IG p. 355 (Step 14)
SRB:. pp. 110-111, 112-119
BM: pp. 14-15 (Item 10)**,** pp. 56-57 (Item 8)

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.

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

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.

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

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.

FOSS Mixtures and Solutions
IG: pp. 98 and 298 (Step 22)
SRB: pp. 54-61
DOR: *Water Cycle*

GRADE 5

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.16

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.

FOSS Earth and Sun
IG: pp. 57, 59, 61, pp. 352-361
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.

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.
- 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.

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

Influence of Engineering, Technology, and Science on Society and the Natural World
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

FOSS Earth and Sun
IG: pp. 346 (Step 28) and 360 (Step 27)
SRB: pp. 110-111

FOSS Mixtures and Solutions
IG: p. 300
SRB: pp. 62-69

GRADE 5

Engineering Design

The following FOSS program elements address the standards indicated below. References are selected and do not reflect every possible alignment to a standard.

Standard S.5.17

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.

FOSS Mixtures and Solutions
IG: pp. 49, 51, 53, 96, 127 (Step 6), 127 (Step 9), 132 (Step 21), 297 (Steps 16-21), 301 (Step 29)
EA: *Notebook Entry,* IG p. 298 (Step 21)
BM: pp. 4-5 (Item 3a)

FOSS Earth and Sun
IG: pp. 352-361
EA: *Performance Assessment,* IG p. 355 (Step 14)
SRB:. pp. 110-111, 112-119
BM: pp. 14-15 (Item 10)**,** pp. 56-57 (Item 8)

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.

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.

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.

FOSS Earth and Sun
IG: pp. 295, 304-305, 354 (Step 7)

FOSS Mixtures and Solutions
IG: pp. 96, 132 (Steps 19-21)