GRADE K

Motion and Stability of Forces

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

Performance Expectation K.PS2.1

Students who demonstrate understanding can:
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Clarification Statement: Example investigations include observing the movement of different objects being pulled by a string, observing different objects pushed on a surface and up and down a ramp, or observing how two objects (e.g., toy cars, balls) interact when they collide. Observations should be collected directly through exploratory play with opportunities to work with peers to share ideas for investigations and observations. Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.

Materials and Motion Module
Investigation 4, Parts 1-4, Embedded Assessment: Teacher observation checklists

Science and Engineering Practices

Planning and Carrying Out Investigations
With guidance, plan and conduct an investigation in collaboration with peers.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-280
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, pp. 286-290
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, pp. 296-299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Disciplinary Core Ideas

- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- A bigger push or pull makes things speed up or slow down more quickly.
- When objects touch or collide, they push on one another and can change motion.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-282
SE: *Pushes and Pulls,* pp. 47-59
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, pp. 286-282
SE: *Collisions,* pp. 60-68
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, pp. 296-299
DR: "Roller Coaster Builder," p. 299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Crosscutting Concepts

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-282
SE: *Pushes and Pulls,* pp. 47-59
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, pp. 286-282
SE: *Collisions,* pp. 60-68
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, p. 296-299
DR: "Roller Coaster Builder," p. 299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Scale, Proportion, and Quantity
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE K

Motion and Stability of Forces

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

Performance Expectation K.PS2.2

Students who demonstrate understanding can:
Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.*

Clarification Statement: Data should be limited to observational data collected through exploration-based play of simple design solutions to address problems. Example problems include having an object (e.g., toy car or ball) move a certain distance, follow a particular path, or knock down other objects. Designed solutions could include using or building a ramp to increase the speed of the object, using objects that would cause an object like a toy car or ball to follow a particular path. Emphasis is on basic play as a means to develop a designed solution and test that design. Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.

Materials and Motion Module
Investigation 4, Parts 1-4, Embedded Assessment: Teacher observation checklists

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze data from tests of an object or tool to determine if it works as intended.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-280
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, pp. 286-290
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, pp. 296-299
DR: "Roller Coaster Builder," p. 299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Disciplinary Core Ideas

- Objects in contact exert forces on each other.
- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Such problems may have many acceptable solutions.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-282
SE: *Pushes and Pulls,* pp. 47-59
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, pp. 286-292
SE: *Collisions,* pp. 60-68
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, pp. 296-299
DR: "Roller Coaster Builder," p. 299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Crosscutting Concepts

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Materials and Motion
TE: Investigation 4, Part 1, pp. 277-282
SE: *Pushes and Pulls,* pp. 47-59
Plan for assessment, pp. 275-276, Step 7

Investigation 4, Part 2, p. 286-292
SE: *Collisions,* p. 60-68
Plan for assessment, p.285, Step 8

Investigation 4, Part 3, p. 296-299
DR: "Roller Coaster Builder," p. 299
Plan for assessment, p. 295, Step 11

Investigation 4, Part 4, pp. 303-305
Plan for assessment, p. 302, Step 5

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems
Planning and Carrying Out Investigations
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Scale, Proportion, and Quantity
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE K

Energy

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

Performance Expectation K.PS3.1

Students who demonstrate understanding can:
Make observations to determine the effect of sunlight on Earth's surface.

Clarification Statement: Making observations should include opportunities to directly observe surfaces (e.g. sand, soil, rocks, or playground equipment) in direct sunlight, partial sunlight and shade with opportunities to explore and discuss observed patterns of the sun's impact on those surfaces. Opportunities to share noticings and wonderings should be encouraged. Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.

Trees and Weather Module
Investigation 3, Part 2, Embedded Assessment: Teacher observation checklists

Materials and Motion Module
Investigation 3, Part 6, Embedded Assessment: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Make observations (firsthand or from media) to collect data that can be used to make comparisons. ***Trees and Weather*** **TE:** Investigation 3, Part 2, pp. 186-189 Plan for assessment, p. 185, Step 7 ***Materials and Motion*** **TE:** Investigation 3, Part 6, pp. 254-260	•Sunlight warms the Earth's surface. ***Trees and Weather*** **TE:** Investigation 3, Part 2, pp. 186-189 Plan for assessment, p. 185, Step 7 ***Materials and Motion*** **TE:** Investigation 3, Part 6, pp. 254-260	**Cause and Effect** Events have causes that generate observable patterns. ***Trees and Weather*** **TE:** Investigation 3, Part 2, pp. 186-189 Plan for assessment, p. 185, Step 7 ***Materials and Motion*** **TE:** Investigation 3, Part 6, pp. 254-260

Additional Science and Engineering Practices Addressed
Analyzing and Interpreting Data
Using mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Systems and System Models

GRADE K

From Molecules to Organisms: Structure and Function

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

Performance Expectation K.LS1.1

Students who demonstrate understanding can:

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Clarification Statement: Examples of observable patterns could include that animals need to take in food but plants do not; the different Kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water. Observations could be collected through nature walks around the playground and videos. Patterns of similarities and differences among different animals or between plants and animals should be discussed. Assessment Boundary: Assessment is limited to observations and not how plants use light (photosynthesis).

Animals Two by Two Module

Investigations 1-4, Embedded Assessment: Teacher observation checklists

Trees and Weather Module

Investigations 1, 2, and 4, Embedded Assessment: Teacher observation checklists

Science and Engineering Practices

Analyzing and Interpreting Data

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

Animals Two by Two

TE: Investigation 1, Part 1, pp. 84-85
Investigation 1, Part 2, pp. 88-90
Investigation 1, Part 4, pp. 98-103,
SE: *Fish Same and Different,* pp. 3-9
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-114
SE: *Birds Outdoors,* pp. 20-28

Investigation 2, Part 1, pp. 133-136
Investigation 2, Part 2, p. 139
DR: *Seashore Surprises* (Video)

Investigation 2, Part 3, pp. 145-151
SE*: Water and Land Snails, p. 29-36*

Investigation 3, Part 1, pp. 171-173
Investigation 3, Part 2, pp. 177-181
Investigation 3, Part 3, p. 184-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 1, pp. 205-207
Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Investigation 4, Part 3, pp. 218-223
SE: *Animals All around Us,* pp. 55-66

Investigation 4, Part 4, pp. 227-230
SE: *Living and Nonliving,* pp. 67-86

Disciplinary Core Ideas

- All animals need food in order to live and grow.
- Animals obtain their food from plants or from other animals.
- Plants need water and light to live and grow.

Animals Two by Two

TE: Investigation 1, Part 1, pp. 84-85
Investigation 1, Part 2, pp. 88-90
Investigation 1, Part 4, pp. 98-103,
SE: *Fish Same and Different,* pp. 3-9
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-114
SE: *Birds Outdoors,* pp. 20-28

Investigation 2, Part 1, pp. 133-136
Investigation 2, Part 2, pp. 139
DR: *Seashore Surprises* (Video)

Investigation 2, Part 3, pp. 145-151
SE*: Water and Land Snails,* pp. 29-36

Investigation 3, Part 1, pp. 171-173
Investigation 3, Part 2, pp. 177-181
Investigation 3, Part 3, pp. 184-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 1, pp. 205-207
Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Investigation 4, Part 3, pp. 218-223
SE: *Animals All around Us,* pp. 55-66

Investigation 4, Part 4, pp. 227-230
SE: *Living and Nonliving,* pp. 67-86

Crosscutting Concepts

Patterns

Patterns in the natural and human designed world can be observed and used as evidence.

Animals Two by Two

TE: Investigation 1, Part 4, pp. 98-103,
SE: *Fish Same and Different,* pp. 3-9
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-114
SE: *Birds Outdoors,* pp. 20-28

Investigation 2, Part 1, pp. 133-136
Investigation 2, Part 2, p. 139
DR: *Seashore Surprises* (Video)

Investigation 2, Part 3, pp. 145-151
SE*: Water and Land Snails,* pp. 29-36

Investigation 3, Part 2, pp. 177-181
Investigation 3, Part 3, pp. 184-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Investigation 4, Part 3, pp. 218-223
SE: *Animals All around Us,* pp. 55-66

Investigation 4, Part 4, pp. 227-230
SE: *Living and Nonliving,* pp. 67-86
Book: *Animals Two by Two*

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Book: *Animals Two by Two* ***Trees and Weather*** **TE:** Investigation 1, Part 1, pp. 86-91, Plan for assessment, p. 85, Step 14 Investigation 1, Part 5, pp. 108-113 **SE:** *Where Do Trees Grow?* pp. 3-13 Plan for assessment, p. 107, Step 8 Investigation 1, Part 6, pp. 117-123 **SE:** *What Do Plants Need?* pp. 14-19 **Posters**: "A Tree Comes to Class" Plan for assessment, p. 116, Step 11 Investigation 4, Part 3, p. 228 **DR: "***Who Lives Here?"* Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5	**Book:** *Animals Two by Two* ***Trees and Weather*** **TE:** Investigation 1, Part 1, pp. 86-91 Plan for assessment, p. 85, Step 14 Investigation 1, Part 5, pp. 108-113 **SE:** *Where Do Trees Grow?* pp. 3-13 Plan for assessment, p. 107, Step 8 Investigation 1, Part 6, p. 117-123 **Posters**: "A Tree Comes to Class" **SE:** *What Do Plants Need?* pp. 14-19 Plan for assessment, p. 116, Step 11 Investigation 4, Part 3, p. 228 **DR: "***Who Lives Here?"* Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5	***Trees and Weather*** **TE:** Investigation 1, Part 2, p. 95-96, Plan for assessment, p. 94, Step 4 Investigation 1, Part 5, p. 108-113, p. 107 **SE:** *Where Do Trees Grow? p. 3-13* Plan for assessment, p. 107, Step 8 Investigation 1, Part 6, p. 117-123 **Posters**: "A Tree Comes to Class" **SE:** *What Do Plants Need?* pp. 14-19 Plan for assessment, p. 116, Step 11 Investigation 2, Part 1, pp. 139-141 Plan for assessment, p. 138, Step 7 Investigation 2, Part 3, pp. 150-152 Plan for assessment, p. 149, Step 7 Investigation 2, Part 5, pp. 160-162, p. 159 **DR:** Once There Was a Tree (Video), Ch 1 Investigation 4, Part 3, pp. 227-228 Plan for assessment, p. 226, Step 6 Investigation 4, Part 4, pp. 232-234 Plan for assessment, p. 231, Step 6 Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5 Investigation 4, Part 9, pp. 254-255 **DR**: "Summer" (Video), Chapters 1, 3, 4, 5 Plan for assessment, p. 253, Step 6

Additional Science and Engineering Practices Addressed

Asking Questions
Developing and Using Models
Planning and Carrying Out Investigations
Constructing Explanations
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Systems and System Models
Stability and Change
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE K

Earth Systems

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

Performance Expectation K.ESS2.1

Students who demonstrate understanding can:
Use and share observations of local weather conditions to describe patterns over time.

Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months. Assessment Boundary: Assessment of temperature is limited to whole numbers for patterns, and relative measures such as warmer/cooler for temperatures.

Trees and Weather Module
Investigation 3, Parts 1-3, Embedded Assessment: Teacher observation checklist
Investigation 4, Parts 2, 4, and 9, Embedded Assessment: Teacher observation checklist

Science and Engineering Practices

Analyzing and Interpreting Data
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

Trees and Weather
TE: Investigation 3, Part 1, pp. 179-181
SE: *Up in the Sky,* pp. 20-31
Plan for assessment, p. 178, Step 9

Investigation 3, Part 2, pp. 186-189
Plan for assessment, p. 185, Step 7

Investigation 3, Part 3, pp. 194-202
Plan for assessment, p. 193, Step 13

Investigation 4, Part 2, pp. 221-223
Plan for assessment, p. 220, Step 6

Investigation 4, Part 4, pp. 232-234
Plan for assessment, p. 231, Step 6

Investigation 4, Part 9, pp. 254-257
Plan for assessment, p. 253, Step 6

Disciplinary Core Ideas

- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.
- People measure these conditions to describe and record the weather and to notice patterns over time.

Trees and Weather
TE: Investigation 3, Part 1, pp. 179-181
SE: *Up in the Sky,* pp. 20-31
Plan for assessment, p. 178, Step 9

Investigation 3, Part 2, pp. 186-189
Plan for assessment, p. 185, Step 7

Investigation 3, Part 3, pp. 194-202
SE: *Weather,* pp. 32-46
DR: Come a Tide (Video), Ch. 3-4
Plan for assessment, p. 193, Step 13

Investigation 4, Part 2, pp. 221-223
SE: *My Apple Tree,* p. 47-50
Plan for assessment, p. 220, Step 6

Investigation 4, Part 4, pp. 232-234
SE: *Orange Trees,* pp. 51-56
Plan for assessment, p. 231, Step 6

Investigation 4, Part 9, pp. 254-257
SE: *Maple Trees,* pp. 57-60
Plan for assessment, p. 253, Step 6

Crosscutting Concepts

Patterns
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Trees and Weather
TE: Investigation 3, Part 1, pp. 179-181
SE: *Up in the Sky,* pp. 20-31
Plan for assessment, p. 178, Step 9

Investigation 3, Part 2, pp. 186-189
Plan for assessment, p. 185, Step 7

Investigation 3, Part 3, pp. 194-202
SE: *Weather,* pp. 32-46
DR: Come a Tide (Video), Ch. 3-4
Plan for assessment, p. 193, Step 13

Investigation 4, Part 2, p. 221-223
SE: *My Apple Tree,* p. 47-50
Plan for assessment, p. 220, Step 6

Investigation 4, Part 4, pp. 232-234
SE: *Orange Trees,* pp. 51-56
Plan for assessment, p. 231, Step 6

Investigation 4, Part 9, pp. 254-257
SE: *Maple Trees,* pp. 57-60
DR: Summer (Video) (about seasons)
Plan for assessment, p. 253, Step 6

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Stability and Change
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE K

Earth Systems

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

Performance Expectation K.ESS2.2

Students who demonstrate understanding can:
Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Clarification Statement: Arguments center on sharing examples of how plants and animals change their environments and discussing ideas as to why those changes meet a need of plants and animals (e.g., shelter, food, room to grow). Examples of arguments could include squirrels digging in the ground to hide food, tree roots breaking sidewalks, birds building a nest to protect their young. Assessment Boundary: Arguments should be based on qualitative not quantitative evidence.

Animals Two by Two Module
Investigations 2- 4, Embedded Assessment, Teacher observation checklist

Trees and Weather Module
Investigation 1- 2, Embedded Assessment, Teacher observation checklist

Science and Engineering Practices

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

Animals Two by Two
TE: Investigation 2, Part 2, p. 139
DR: Seashore Surprise (Video), Ch 1-2

Investigation 2, Part 3, pp. 149-151
SE: *Water and Land Snails,* p. 29-36

Investigation 3, Part 2, pp. 177-181
Investigation 3, Part 3, pp. 186-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Trees and Weather
TE: Investigation 1, Part 1, pp. 86-91
Plan for assessment, p. 85, Step 14

Investigation 1, Part 5, pp. 108-110
Plan for assessment, p. 107, Step 8

Investigation 2, Part 5, pp. 160-162
Book: Our Very Own Tree
DR: Once There Was a Tree (Video)
Plan for assessment, p. 159, Step 6

Disciplinary Core Ideas

- Plants and animals can change their environment.
- Things that people do to live comfortably can affect the world around them.

Animals Two by Two
TE: Investigation 2, Part 2, p. 139
DR: Seashore Surprise (Video), Ch 1-2

Investigation 2, Part 3, pp. 149-151
SE: *Water and Land Snails,* p. 29-36

Investigation 3, Part 2, pp. 177-181

Investigation 3, Part 3, pp. 186-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Trees and Weather
TE: Investigation 1, Part 2, pp. 95-96
Plan for assessment, p. 94, Step 4

Investigation 2, Part 5, pp. 160-162
Book: Our Very Own Tree
DR: Once There Was a Tree (Video)
Plan for assessment, p. 159, Step 6

Crosscutting Concepts

Systems and System Models
Systems in the natural and designed world have parts that work together.

Animals Two by Two
TE: Investigation 2, Part 2, p. 139
DR: Seashore Surprise (Video), Ch 1-2

Investigation 2, Part 3, pp. 149-151
SE: *Water and Land Snails,* p. 29-36

Investigation 3, Part 2, pp. 177-181
Investigation 3, Part 3, pp. 186-189
SE: *Worms in Soil,* pp. 37-47

Investigation 4, Part 2, pp. 210-214
SE: *Isopods,* pp. 48-54

Trees and Weather
TE: Investigation 1, Part 2, pp. 95-96
Plan for assessment, p. 94, Step 4

Investigation 2, Part 5, pp. 160-162
Book: Our Very Own Tree
DR: Once There Was a Tree (Video)
Plan for assessment, p. 159, Step 6

Additional Science and Engineering Practices Addressed Asking Questions; Developing and Using Models; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Patterns; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE K

Earth and Human Activity

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

Performance Expectation K.ESS3.1

Students who demonstrate understanding can:
Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

Clarification Statement: Models could include drawings, physical replicas, or dramatizations that show relationships between plants or animals and their surroundings. Examples of relationships could include that squirrels eat nuts and seeds, and therefore, they usually live near trees; and grasses need sunlight, so they often grow in meadows with no or few trees. Opportunities to share noticings and wonderings should be encouraged.
Assessment Boundary: N/A

Animals Two by Two Module
Investigations 1-4, Embedded Assessment: Teacher observation checklists
Trees and Weather Module
Investigations 1, 2, and 4, Embedded Assessment: Teacher observation checklists

Science and Engineering Practices

Developing and Using Models
Use a model to represent relationships in the natural world.

Animals Two by Two
TE: Investigation 1, Part 2, pp. 88-90
Plan for assessment, p. 87, Step 6

Investigation 1, Part 3, pp. 93-95
Plan for assessment, p. 92, Step 4

Investigation 1, Part 4, pp. 102-103
SE: *Fish Same and Different, pp. 3-9*
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-112
Plan for assessment, p. 106, Step 11

Investigation 2, Part 3, pp. 145-151
SE: *Water and Land Snails*, pp. 29-38
Plan for assessment, p. 144, Step 12

Investigation 3, Part 2, pp. 177-181
Plan for assessment, p. 176, Step 7

Investigation 3, Part 3, pp. 186-189
SE: *Worms in Soil,* pp. 37-47
Plan for assessment, p.183, Step 5

Investigation 4, Part 1, pp. 212-214
SE: *Isopods,* pp. 48-54
Plan for assessment, p. 209

Investigation 4, Part 4, pp. 227-230
SE: *Living and Nonliving,* pp. 67-86
Plan for assessment, p. 226, Step 8

Disciplinary Core Ideas

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

Animals Two by Two
TE: Investigation 1, Part 1, pp. 84-85
Plan for assessment, p. 83

Investigation 1, Part 2, pp. 88-90
Plan for assessment, p. 87, Step 6

Investigation 1, Part 3, pp. 93-95
Plan for assessment, p. 92, Step 4

Investigation 1, Part 4, pp. 102-103
SE: *Fish Same and Different, pp. 3-9*
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-112
Plan for assessment, p. 106, Step 11

Investigation 2, Part 1, pp. 133-136
Plan for assessment, p. 132, Step 6

Investigation 2, Part 3, pp. 145-151
SE: *Water and Land Snails*, pp. 29-38
Plan for assessment, p. 144, Step 12

Investigation 3, Part 1, pp. 171-173
Plan for assessment, p. 170, Step 6

Investigation 3, Part 2, pp. 177-181
Plan for assessment, p. 176, Step 7

Investigation 3, Part 3, pp. 186-189

Crosscutting Concepts

Systems and System Models
Systems in the natural and designed world have parts that work together.

Animals Two by Two
TE: Investigation 1, Part 1, pp. 84-85
Plan for assessment, p. 83

Investigation 1, Part 3, pp. 93-95
Plan for assessment, p. 92, Step 4

Investigation 1, Part 4, pp. 102-103
SE: *Fish Same and Different, pp. 3-9*
Fish Live in Many Places, pp. 10-19

Investigation 1, Part 5, pp. 107-112
Plan for assessment, p. 106, Step 11

Investigation 2, Part 1, pp. 133-136
Plan for assessment, p. 132, Step 6

Investigation 2, Part 3, pp. 145-151
SE: *Water and Land Snails*, pp. 29-38
Plan for assessment, p. 144, Step 12

Investigation 3, Part 1, pp. 171-173
Plan for assessment, p. 170, Step 6

Investigation 3, Part 2, pp. 177-181
Plan for assessment, p. 176, Step 7

Investigation 3, Part 3, pp. 186-189
SE: *Worms in Soil,* pp. 37-47
Plan for assessment, p.183, Step 5

Investigation 4, Part 1, pp. 212-214
SE: *Isopods,* pp. 48-54

Trees and Weather **TE:** Investigation 1, Part 1 , pp. 86-91 Plan for assessment, p. 85, Step 14 Investigation 1, Part 2, pp. 95-96 Plan for assessment, p. 94, Step 4 Investigation 1, Part 5, pp. 108-113 **SE:** *Where Do Trees Grow?* pp. 3-13 Plan for assessment, p. 107, Step 8 Investigation 2, Part 5, pp. 160-162 Book: "Our Very Own Tree" **DR:** Once There Was a Tree (Video), Ch 1 and 2 Plan for assessment, p. 159, Step 6 Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5 Investigation 4, Part 9, pp. 256-257 **DR:** Summer (Video), Chapters 1, 3, 4, 5 Plan for assessment, p. 253 Step 6	**SE:** *Worms in Soil,* pp. 37-47 Plan for assessment, p.183, Step 5 Investigation 4, Part 1, pp. 212-214 **SE:** *Isopods,* pp. 48-54 Plan for assessment, p. 209 Investigation 4, Part 2, pp. 212-214 **SE:** *Isopods,* pp. 48-54 Plan for assessment, p. 209 ***Trees and Weather*** **TE:** Investigation 1, Part 1 , pp. 86-91 Plan for assessment, p. 85, Step 14 Investigation 1, Part 2, pp. 95-96 Plan for assessment, p. 94, Step 4 Investigation 1, Part 5, pp. 108-113 **SE:** *Where Do Trees Grow?* pp. 3-13 Plan for assessment, p. 107, Step 8 Investigation 2, Part 5, pp. 160-162 Book: "Our Very Own Tree" **DR:** Once There Was a Tree (Video), Ch 1 and 2 Plan for assessment, p. 159, Step 6 Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5 Investigation 4, Part 9, pp. 256-257 **DR:** Summer (Video), Chapters 1, 3, 4, 5 Plan for assessment, p. 253, Step 6	Plan for assessment, p. 209 Investigation 4, Part 2, pp. 212-214 **SE:** *Isopods,* pp. 48-54 Plan for assessment, p. 209 ***Trees and Weather*** **TE:** Investigation 1, Part 1, pp. 86-91 Plan for assessment, p. 85, Step 14 Investigation 1, Part 2, pp. 95-96 Plan for assessment, p. 94, Step 4 Investigation 1, Part 5, pp. 108-113 **SE:** *Where Do Trees Grow?* pp. 3-13 Plan for assessment, p. 107, Step 8 Investigation 2, Part 5, pp. 160-162 **Book**: "Our Very Own Tree" **DR:** Once There Was a Tree (Video), Ch 1-2 Plan for assessment, p. 159, Step 6 Investigation 4, Part 6, pp. 241-243 **DR:** Once There Was a Tree (Video), Ch 4 Plan for assessment, p. 240, Step 5 Investigation 4, Part 9, pp. 256-257 **DR**: Summer (Video), Chapters 1, 3, 4, 5 Plan for assessment, p. 253, Step 6

Additional Science and Engineering Practices Addressed
Cause and Effect
Structure and Function

GRADE K

Earth and Human Activity

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

Performance Expectation K.ESS3.2

Students who demonstrate understanding can:
Ask questions to understand the purpose of weather forecasting to prepare for and respond to severe weather.*

Clarification Statement: Questions may arise or be encouraged through observations, interest, text, or media. Emphasis is on weather forecasting of local weather and how weather forecasting can help people plan for, and respond to, specific types of local weather (e.g., staying indoors during severe weather, going to cool places during heat waves). Assessment Boundary: Assessment does not include causes for severe weather.

Trees and Weather Module
Investigation 3, Part 3, Embedded Assessment, Teacher observation checklists

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions, making observations, and gathering information are helpful in thinking about problems.

Trees and Weather
TE: Investigation 3, Part 3, pp. 198-200
SE: *Weather,* pp. 32-46
DR: Come a Tide (Video), Chapters 3-4
Plan for assessment, p. 193, Step 13

Disciplinary Core Ideas

- Some kinds of severe weather are more likely than others in a given region.
- Weather forecasters forecast severe weather so that the communities can prepare for and respond to these events.
- People depend on various technologies in their lives; human life would be very different without technology.

Trees and Weather
TE: Investigation 3, Part 3, pp. 198-200
SE: *Weather,* pp. 32-46
DR: Come a Tide (Video), Chapters 3-4
Plan for assessment, p. 193, Step 13

Crosscutting Concepts

Cause and Effect
Events have causes that generate observable patterns.

Trees and Weather
TE: Investigation 3, Part 3, pp. 198-200
SE: *Weather,* pp. 32-46
DR: Come a Tide (Video), Chapters 3-4
Plan for assessment, p. 193, Step 13

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigation Listed
Obtaining, Evaluating, and Communicating Information

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 1.PS4.1

Students who demonstrate understanding can:
Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

Clarification Statement: Examples of vibrating materials that make sound could include tuning forks, kazoos, plucking a stretched string or rubber band, and stringed instruments. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound, placing hand on personal larynx or mouth while humming, and holding an object near a vibrating tuning fork.

Sound and Light Module
Investigation 1, All Parts: Notebook entries, Performance assessments, I-Check
Investigation 2, All Parts: Notebook entries, Performance assessments, I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

Sound and Light
TE: Investigation 1, Part 1, pp. 90-92, 95-97
Investigation 1, Part 2, pp. 104-109

Investigation 2, Part 1, pp. 135-138
Investigation 2, Part 2, pp. 143-146
Investigation 2, Part 3, pp. 152-154
Investigation 2, Part 4, pp. 161-165

Disciplinary Core Ideas

- Sound can make matter vibrate, and vibrating matter can make sound.

Sound and Light
TE: Investigation 1, Part 1, pp. 90-97
SE: *Vibrations and Sound,* pp. 3-7

Investigation 1, Part 2, pp. 104-111
SE: *Listen to This,* pp. 8-14

Investigation 1, Part 3, pp. 114-117
DR "Sorting Sounds"

Investigation 2, Part 1, pp. 135-140
SE: *Animal Ears and Hearing,* pp. 15-23

Investigation 2, Part 2, pp. 143-148
SE: *Strings in Motion,* pp. 24-32

Investigation 2, Part 3, pp. 152-158
SE: *More Musical Instruments,* pp. 33-37
DR: *All About Sound* (Video)

Investigation 2, Part 4, pp. 161-165
DR: "Guitar String Pitch"

Crosscutting Concepts

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Sound and Light
TE: Investigation 1, Part 1, pp. 90-92, 95-97
Investigation 1, Part 2, pp. 104-109
Investigation 1, Part 3, pp. 114-116

Investigation 2, Part 1, pp. 135-138
Investigation 2, Part 2, pp. 143-146
Investigation 2, Part 3, pp. 152-158
Investigation 2, Part 4, pp. 161-165

Additional Science and Engineering Practices Addressed

Asking Questions and Defining Problems
Developing and Using Models
Analyzing and Interpreting Data
Constructing Explanations
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 1.PS4.2

Students who demonstrate understanding can:
Make observations to construct an evidence-based account that objects can be seen only when illuminated.

Clarification Statement: Examples of observations could include those made in a completely dark room or those made in a dark room with the door opened slightly. Illumination could be from an external light source or an object giving off its own light. This can be explored with string lights, mirrors, projectors, and flashlights.

Sound and Light Module
Investigation 4, Part 3, Notebook Entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. ***Sound and Light*** **TE:** Investigation 4, Part 3, pp. 234-237 **DR:** Light and Darkness (Video), p. 234	•Objects can be seen if light is available to illuminate them or if they give off their own light. ***Sound and Light*** **TE**: Investigation 4, Part 3, pp. 234-240 **SE**: *Seeing the Light,* pp. 56-68 **DR:** Light and Darkness (Video), p. 234	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes. ***Sound and Light*** **TE:** Investigation 4, Part 3, pp. 234-237

Additional Science and Engineering Practices Addressed

Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 1.PS4.3

Students who demonstrate understanding can:
Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).Assessment Boundary: Assessment does not include the speed of light or assessment of descriptive words like transparent, translucent, opaque, or reflective.

Sound and Light Module
Investigation 3, Parts 1-3, Notebook Entries, Performance Assessments, and I-Check
Investigation 4, Parts 1, 2 and 4, Notebook Entries, Performance Assessments, and I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

Sound and Light
TE: Investigation 3, Part 1, pp. 180-183
Investigation 3, Part 2, pp. 186-189,

Investigation 3, Part 3, pp. 196-201
DR: All About Light (Video), p. 199
My Shadow (Video), pp. 200-201

Investigation 4, Part 1, pp. 219-223
Investigation 4, Part 2, pp. 226-230
Investigation 4, Part 4, pp. 244-247

Disciplinary Core Ideas

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

Sound and Light
TE: Investigation 3, Part 1, pp. 180-183
Investigation 3, Part 2, pp. 186-192
SE: *Playing in the Light,* pp. 38-45
DR: Light and Shadows (Video)

Investigation 3, Part 3, pp. 196-201
DR: All About Light (Video), p. 199
My Shadow (Video), pp. 200-201

Investigation 4, Part 1, pp. 219-223
Investigation 4, Part 2, pp. 226-230
SE: *Reflections,* pp. 46-55

Investigation 4, Part 4, pp. 244-249
SE: *Communicating with Light*, pp. 67-76

Crosscutting Concepts

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Sound and Light
TE: Investigation 3, Part 1, pp. 180-183
Investigation 3, Part 2, pp. 186-189, pp. 191-192
DR: Light and Shadows (Video)

Investigation 3, Part 3, pp. 196-201
DR: All About Light (Video), pp. 199
My Shadow (Video), pp. 200-201

Investigation 4, Part 1, pp. 219-223
Investigation 4, Part 2
SE: *Reflections,* pp. 46-55

Investigation 4, Part 4, pp. 244-247

Additional Science and Engineering Practices Addressed

Asking Questions
Analyzing and Interpreting Data
Constructing Explanations
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Developing and Using Models
Patterns
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 1.PS4.4

Students who demonstrate understanding can:
Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*

Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats. Assessment Boundary: Assessment does not include technological details for how communication devices work.

Sound and Light Module
Investigation 2, Part 4, Performance Assessment
Investigation 4, Part 4, Performance Assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solution Use tools and materials provided to design a device that solves a specific problem. ***Sound and Light*** **TE:** Investigation 2, Part 4, pp. 161-165 Investigation 4, Part 4, pp. 246-247	•People also use a variety of devices to communicate (send and receive information) over long distances. •People depend on various technologies in their lives; human life would be very different without technology. ***Sound and Light*** **TE:** Investigation 2, Part 4, pp. 161-165 Investigation 4, Part 4, pp. 246-249 **SE:** *Communicating with Light,* pp. 69-76	**Structure and Function** The shape and stability of structures of natural and designed objects are related to their functions. ***Sound and Light*** **TE:** Investigation 2, Part 4, pp. 161-165 Investigation 4, Part 4, pp. 246-247 **SE:** *Reflections,* pp. 46-55, *Communicating with Light,* pp. 69-76

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems
Developing and Using Models

Additional Crosscutting Concepts Addressed
Systems and System Models

*Expectation has an engineering focus/application.

GRADE 1

From Molecules to Organisms: Structure and Function

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

Performance Expectation 1.LS1.1

Students who demonstrate understanding can:
Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and detecting intruders by mimicking eyes and ears.

Plants and Animals Module
Investigation 3, Part 4, Notebook Entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. ***Plants and Animals*** **TE:** Investigation 3, Part 4, pp. 215-217 **SE:** *Learning from Nature,* pp. 57-70	• All organisms have external parts. • Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. • Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. • Animals have body parts that capture and convey different kinds of information needed for growth and survival. • Plants also respond to some external inputs. • Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. ***Plants and Animals*** **TE:** Investigation 1, Part 3, pp. 107-113 Investigation 2, Part 1, pp. 141-145 Investigation 2, Part 2, pp. 149-153 Investigation 2, Part 3, pp. 157-159 Investigation 3, Part 3, pp. 202-206 **DR:** *How Plants Live in Different Places* (Video) Investigation 3, Part 4, pp. 215-217 **SE:** *Learning from Nature,* pp. 57-70 **DR:** "Engineering from Nature" Center Activity; Organism Cards for Engineering Investigation 4, Part 1, pp. 235-238 Investigation 4, Part 2, pp. 242-243	**Structure and Function** The shape and stability of structures of natural and designed objects are related to their functions. ***Plants and Animals*** **TE:** Investigation 3, Part 4, pp. 215-217 **SE**: *Learning from Nature,* pp. 57-70

Additional Science and Engineering Practices Addressed
Obtaining, Evaluating, and Communicating Information

GRADE 1

From Molecules to Organisms: Structure and Function

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

Performance Expectation 1.LS1.2

Students who demonstrate understanding can:
Obtain information from media and/or text to determine patterns in the behavior of parents and offspring that help offspring survive.

Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring). Information may be obtained through observations, media, and/or text.

Plants and Animals Module
Investigation 4, Part 3, Notebook Entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. ***Plants and Animals*** **TE:** Investigation 4, Part 3 , pp. 253-256 **SE:** *Animals and Their Young,* pp. 71-84 **DR:** Animal Offspring and Caring for Animals (Video), p. 255 **DR:** "Find the Parent," p. 255	•Adult plants and animals can have young. •In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. ***Plants and Animals*** **TE:** Investigation 4, Part 3, pp. 253-256 **SE:** *Animals and Their Young,* pp. 71-84 **DR:** Animal Offspring and Caring for Animals (Video), p. 255, **DR:** "Find the Parent" (Online Activity), p. 255	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ***Plants and Animals*** **TE:** Investigation 4, Part 3, pp. 253-256 **SE:** *Animals and Their Young,* pp. 71-84 **DR:** Animal Offspring and Caring for Animals (Video), p. 255 **DR:** "Find the Parent," p. 255

Additional Science and Engineering Practices Addressed
Constructing Explanations

GRADE 1

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 1.LS3.1

Students who demonstrate understanding can:
Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include that leaves from the same kind of plant are the same shape but can differ in size; and that particular breed of dog looks like its parents but is not exactly the same. Assessment Boundary: Assessment does not include inheritance, animals that undergo metamorphosis or hybrids.

Plants and Animals Module
Investigation 1, Part 4, Notebook Entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ***Plants and Animals*** **TE:** Investigation 1, Part 4, pp. 120-125 **SE:** *Variation,* pp. 19-26 **DR:** Animal Growth (Video), p. 125	•Young animals are very much, but not exactly like, their parents. •Plants also are very much, but not exactly, like their parents. •Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. ***Plants and Animals*** **TE:** Investigation 1, Part 4, pp. 120-125 **SE:** *Variation,* pp. 19-26 **DR:** Animal Growth (Video), p. 125	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ***Plants and Animals*** **TE:** Investigation 1, Part 4, pp. 120-125 **SE:** *Variation*, pp. 19-26 **DR:** Animal Growth (Video), p. 125

Additional Science and Engineering Practices Addressed
Analyzing and Interpreting Data
Planning and Carrying out Investigations
Obtaining, Evaluating, and Communicating Information

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Earth's Place in the Universe

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

Performance Expectation 1.ESS1.1

Students who demonstrate understanding can:
Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day. Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.

Air and Weather Module
Investigation 2, Parts 2 and 4, Performance Assessments

Science and Engineering Practices

Analyzing and Interpreting Data
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

Air and Weather
TE: Investigation 2, Part 2, pp. 157-162

Investigation 2, Part 4, pp. 179-183
SE: *Changes in the Sky,* pp. 26-37

Investigation 4, Part 1, pp. 248-251

Disciplinary Core Ideas

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

Air and Weather
TE: Investigation 2, Part 2, pp. 157-162

Investigation 2, Part 4, pp. 179-183
SE: *Changes in the Sky,* pp. 26-37

Investigation 4, Parts 1, pp. 248-251

Crosscutting Concepts

Patterns
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Air and Weather
TE: Investigation 2, Part 2, pp. 157-162

Investigation 2, Part 4, pp. 179-183
SE: *Changes in the Sky,* pp. 26-37

Investigation 4, Part 1, pp. 248-251

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Developing and Using Models
Constructing Explanations
Using Mathematics and Computational Thinking

Additional Crosscutting Concepts Addressed
Cause and Effect
Stability and Change

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Earth's Place in the Universe

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

Performance Expectation 1.ESS1.2

Students who demonstrate understanding can:
Make observations at different times of year to relate the amount of daylight and relative temperature to the time of year.

Clarification Statement: Emphasis is on relative comparisons of the amount of daylight and temperature in the winter to the amount in the spring, fall, or summer. Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Air and Weather Module
Investigation 4, Part 2, Notebook Entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Make observations (firsthand or from media) to collect data that can be used to make comparisons. ***Air and Weather*** **TE:** Investigation 4, Part 2, pp. 255-256 Investigation 4, Part 3, pp. 264-265 **SE:** *Seasons,* pp. 54-61	•Seasonal patterns of sunrise and sunset can be observed, described, and predicted. ***Air and Weather*** **TE:** Investigation 4, Part 2, pp. 255-256 Investigation 4, Part 3, pp. 264-265 **SE:** *Seasons,* pp. 54-61	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ***Air and Weather*** **TE:** Investigation 4, Parts 2, pp. 255-256 Investigation 4, Part 3, pp. 264-265 **SE:** *Seasons,* pp. 54-61

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigation Listed
Asking Questions
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations

Additional Crosscutting Concepts Addressed in FOSS Next Generation Investigation Listed
Stability and Change

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 1

Earth and Human Activity

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

Performance Expectation 1.ESS3.1

Students who demonstrate understanding can:
Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*

Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.

Air and Weather Module
Investigation 3, Part 5

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. ***Air and Weather*** **TE:** Investigation 3, Part 5, p. 231* **SE:** *Resources,* pp.44-61	•Things that people do to live comfortably can affect the world around them. But, they can make choices that reduce their impacts on the land, water, air, and other living things. •Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. ***Air and Weather*** **TE:** Investigation 3, Part 5, p. 231* **SE:** *Resources,* pp.44-61	**Cause and Effect** Events have causes that generate observable patterns. ***Air and Weather*** **TE:** Investigation 3, Part 5, p. 231* **SE:** *Resources,* pp.44-61

*Article provides background information for students to complete expectation on a local level.

GRADE 2

Matter and Its Interactions

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

Performance Expectation 2PS1.1

Students who demonstrate understanding can:
Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share. Investigations could include ice and snow melting or frozen objects thawing. Assessment Boundary: N/A

Solids and Liquids Module
Investigation 1, Parts 1 and 2: notebook entry; Parts 3 and 4: performance assessment; Investigation 1 I-Check
Investigation 2, Part 1: performance assessment; Parts 2 and 3, notebook entry; Investigation 2 I-Check
Investigation 3, Parts 1 and 4: notebook entry; Parts 2 and 3: performance assessment; Investigation 3 I-Check
Investigation 4, Part 2: notebook entry; Part 3: performance assessment; Investigation 4, I-Check

Pebbles, Sand, and Silt Module
Investigation 2, Part 3: notebook entry
Investigation 3, Part 2: notebook entry
Investigation 3, Part 4: notebook entry

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Solids and Liquids
TE: Investigation 1, Part 1, pp. 86-93
Investigation 1, Part 2, pp. 98-103
Investigation 1, Part 3, pp. 106-109
Investigation 1, Part 4, pp. 113-119
Investigation 1, Part 5, pp. 122-126

Investigation 2, Part 1, pp. 147-149
Investigation 2, part 3, pp. 161-164
Investigation 2, Part 4, pp. 170-173

Investigation 3, Part 1, pp. 191-194
Investigation 3, Part 2, pp. 198-200
Investigation 3, Part 3, pp. 204-207
Investigation 3, Part 4, pp. 210-211
Investigation 3, Part 5, pp. 217-219

Investigation 4, Part 1, pp. 239-246
Investigation 4, Part 2, pp. 250-252
Investigation 4, Part 3, pp. 257-260
Investigation 4, Part 4, pp. 265-269

Disciplinary Core Ideas

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature.
- Matter can be described and classified by its observable properties.
- Different properties are suited to different purposes.

Solids and Liquids
TE: Investigation 1, Part 1, pp. 86-93
SE: *Everything Matters,* pp. 3-11

Investigation 1, Part 2, pp. 98-103
SE: *Solid Objects and Materials,* pp. 12-21
DR: Clothing and Building Materials (Video)

Investigation 1, Part 3, pp. 106-109

Investigation 1, Part 4, pp. 113-119,
SE: *Towers,* pp. 22-25, *Bridges,* pp. 26-30
DR: Properties of Materials (Video)

Investigation 1, Part 5, pp. 122-126

Investigation 2, Part 1, pp. 147-149
Investigation 2, Part 2, pp. 153-157
DR: All about Properties of Matter (Video), Ch 1 and 2

Crosscutting Concepts

Patterns
Patterns in the natural and human-designed world can be observed.

Solids and Liquids
TE: Investigation 1, Part 3, pp. 106-109

Investigation 2, Part 1, pp. 147-149
Investigation 2, Part 3, pp. 161-167
SE: *Liquids,* pp. 38-43
DR: "Falling-Bottle Puzzle"

Investigation 3, Part 1, pp. 191-194
Investigation 3, Part 3, pp. 203-207
Investigation 3, Part 4, pp. 210-211

Pebbles, Sand, and Silt
TE: Investigation 2, Part 3, pp. 150-154

Investigation 3, Part 2, , pp. 193-195
Investigation 3, Part 4, pp. 205-207

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Pebbles, Sand, and Silt **TE:** Investigation 2, Part 3, pp. 150-154 Investigation 3, Part 2, pp. 193-195 Investigation 3, Part 4, pp. 205-207	Investigation 2, Part 3, pp. 161-167 **SE:** *Liquids,* pp. 38-43 **DR:** "Falling-Bottle Puzzle" Investigation 2, Part 4, pp. 170-173 Investigation 3, Part 1, pp. 191-194 Investigation 3, Part 2, pp. 198-200 Investigation 3, Part 3, pp. 204-207 Investigation 3, Part 4, pp. 210-213 **SE**: *Pouring,* pp. 38-43 Investigation 3, Part 5, pp. 217-221 **SE:** *Comparing Solids and Liquids,* pp. 44-53 Investigation 4, Part 1, pp. 239-246 Investigation 4, Part 2, pp. 250-254 Investigation 4, Part 3, pp. 257-260 Investigation 4, Part 4, pp. 265-272 **SE:** *Heating and Cooling*, pp. 62-68; *Is Change Reversible?* pp. 68-76 **DR:** "Change It!"; Solids and Liquids (Video); "Tutorial: States of Matter" ***Pebbles, Sand, and Silt*** **TE:** Investigation 2, Part 3, pp. 150-154 Investigation 3, Part 2, pp. 193-195 Investigation 3, Part 4, pp. 205-207 Investigation 4, Part 3, pp. 252-253 **SE:** *States of Water,* pp. 61-67	

Additional Science and Engineering Practices Addressed

Developing and Using Models
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Systems and System Models
Cause and Effect
Energy and Matter
Structure and Function
Scale, Proportion and Quantity

GRADE 2

Matter and Its Interactions

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

Performance Expectation 2.PS1.2

Students who demonstrate understanding can:
Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for the intended purpose.*

Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency (e.g. paper towels could be utilized to measure absorbency and strength). Assessment Boundary: Assessment of quantitative measurements is limited to length.

Solids and Liquids Module
Investigation 1, Part 4: notebook entry; Investigation 1 I-Check

Pebbles, Sand, and Silt Module
Investigation 3, Part 1: notebook entry

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze data from tests of an object or tool to determine if it works as intended.

Solids and Liquids
TE: Investigation 1, Part 4, pp. 113-119

Pebbles, Sand, and Silt
TE: Investigation 3, Part 1, pp. 199-201

Disciplinary Core Ideas

- Different properties are suited to different purposes.
- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

Solids and Liquids
TE: Investigation 1, Part 4, pp. 113-119
SE: *Towers,* pp. 22-25, *Bridges,* pp. 26-30
DR: Properties of Materials (Video)

Pebbles, Sand, and Silt
TE: Investigation 3, Part 1, pp. 199-201
SE: *Making Things, with Rocks,* pp. 31-37

Crosscutting Concepts

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Solids and Liquids
TE: Investigation 1, Part 4, pp. 113-119
SE: *Towers,* pp. 22-25, *Bridges,* pp. 26-30
DR: Properties of Materials (Video)

Pebbles, Sand, and Silt
TE: Investigation 3, Part 1, pp. 199-201
SE: *Making Things, with Rocks,* pp. 31-37

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed

Asking Questions
Developing and Using Models
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence

Additional Crosscutting Concepts Addressed

Cause and Effect
Structure and Function
Scale Proportion and Quantity
Systems and System Models

GRADE 2

Materials and Its Interactions

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

Performance Expectation 2.PS1.3

Students who demonstrate understanding can:
Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

Clarification Statement: Examples of pieces could include building blocks, or other assorted small objects. Provide students with the same number of pieces to create a different object. Assessment Boundary: Do not introduce terminology associated with the Law of Conservation of Matter just concepts. Chemical change is outside of this performance expectation.

Solids and Liquids Module
Investigation 1, Part 4: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ***Solids and Liquids*** **TE:** Investigation 1, Part 4, pp. 113-119	•A great variety of objects can be built up from a small set of pieces. •Different properties are suited to different purposes. ***Solids and Liquids Module*** **TE:** Investigation 1, Part 4, pp. 113-119	**Energy and Matter** Objects may break into smaller pieces and be put together into larger pieces, or change shapes. ***Solids and Liquids Module*** **TE:** Investigation 1, Part 4, pp. 113-119

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Developing and Using Models

Additional Crosscutting Concepts Addressed
Structure and Function
Systems and System Models

GRADE 2

Matter and Its Interactions

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

Performance Expectation 2.PS1.4

Students who demonstrate understanding can:
Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Clarification Statement: Demonstrations of reversible changes could include materials such as water, butter, or crayons at different temperatures. Demonstrations of irreversible changes could include cooking an egg, freezing a plant leaf, or heating paper. Arguments center on using first-hand observations as evidence to support a claim that a material can change and go back to its original form through heating and cooling. Assessment Boundary: Students should not be expected to identify or explain physical and chemical changes.

Solids and Liquids Module
TE: Investigation 4, Part 4, notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct an argument with evidence to support a Claim. ***Solids and Liquids*** **TE:** Investigation 4, Part 4, pp. 265-273 **SE**: *Heating and Cooling,* pp. 62-67; *Is Change Reversible?* pp. 68-76 **DR:** "Change It!" Solids and Liquids (Video)	•Heating or cooling a substance may cause changes that can be observed. •Sometimes these changes are reversible, and sometimes they are not. ***Solids and Liquids*** **TE:** Investigation 4, Part 4, pp. 265-273 **SE**: *Heating and Cooling,* pp. 62-67; *Is Change Reversible?* pp. 68-76 **DR:** "Change It!" Solids and Liquids (Video)	**Cause and Effect** Events have causes that generate observable patterns. ***Solids and Liquids*** **TE:** Investigation 4, Part 4, pp. 265-273 **SE**: *Heating and Cooling,* pp. 62-67; *Is Change Reversible?* pp. 68-76 **DR:** "Change It!" Solids and Liquids (Video)

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations

Additional Crosscutting Concepts Addressed
Energy and Matter
Stability and Change

GRADE 2

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 2.LS2.1

Students who demonstrate understanding can:
Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Clarification Statement: Investigations should be limited to testing one variable at a time. Assessment Boundary: Assessment is limited to testing one variable at a time, although students are not expected to understand the term variable at this time.

Insects and Plants Module
Investigation 2, Parts 1-2: performance assessment

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Insects and Plants
TE: Investigation 2, Part 1, pp. 144-148
Investigation 2, Part 2, pp. 152-159
DR: How Plants Grow (Video)
What is Pollination? (Video)

Disciplinary Core Ideas

- Plants depend on water and light to grow.

Insects and Plants
TE: Investigation 2, Part 1, pp. 144-148
Investigation 2, Part 2, pp. 152-159
DR: How Plants Grow (Video)
What is Pollination? (Video)

Crosscutting Concepts

Cause and Effect
Events have causes that generate observable patterns.

Insects and Plants
TE: Investigation 2, Part 1, pp. 144-148
Investigation 2, Part 2, pp. 152-159
DR: How Plants Grow (Video)
What is Pollination? (Video)

Additional Science and Engineering Practices Addressed
Constructing Explanations
Obtaining, Evaluating, and Communicating Information

GRADE 2

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 2LS2.2

Students who demonstrate understanding can:
Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

Clarification Statement: Examples include: placing socks on the outside of students' shoes and walking outside allows socks to gather seeds ,plant sock(s) to see what grows, use a pipe cleaner to move powder (like flour) from one place to another emulating flowers being pollinated by bees or other insects. Assessment Boundary: N/A Science and Engineering Practice

Insects and Plants Module
Investigation 2, Part 2: Background information and Part 4: performance assessment
Investigation 5, Part 4: performance assessment

Science and Engineering Practices

Developing and Using Models
Develop a simple model based on evidence to represent a proposed object or tool.

Insects and Plants
TE: Investigation 2, Part 2, p. 158
DR: What is Pollination? (Video)

Investigation 2, Part 4, pp. 177-178
SE: *How Seeds Travel,* pp. 27-34
DR: How Seeds Get Here…And There (Video)

Investigation 5, Part 4, pp. 314-318
DR: What is Pollination? (Video)

Disciplinary Core Ideas

- Plants depend on animals for pollination or to Move their seeds around.
- Designs can be conveyed through sketches, drawings, or physical models.
- These representations are useful in communicating ideas for a problem's solutions to other people.

Insects and Plants
TE: Investigation 2, Part 2, p. 158
DR: What is Pollination? (Video)

Investigation 2, Part 4, pp. 177-178
SE: *How Seeds Travel,* pp. 27-34
DR: How Seeds Get Here…And There (Video)

Investigation 5, Part 4
DR: What is Pollination? (Video)

Crosscutting Concepts

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

Insects and Plants
TE: Investigation 2, Part 4, pp. 177-178
SE: *How Seeds Travel,* pp. 27-34
DR: How Seeds Get Here…And There (Video)

Investigation 5, Part 4, pp. 314-318
DR: What is Pollination? (Video)

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Cause and Effect

GRADE 2

Biological Unity and Diversity

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

Performance Expectation 2.LS4.1

Students who demonstrate understanding can:
Make observations of plants and animals to compare the diversity of life in different habitats.

Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats. Students could explore different habitats such as a neighborhood park, ponds, and the school playground. Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.

Insects and Plants Module
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 2, Part 1: notebook entry
Investigation 2, Part 2: performance assessment
Investigation 2, Part 3: notebook entry
Investigation 2, Part 4, notebook entry; Investigation 2 I-Check
Investigation 3, Parts 1-3: notebook entry
Investigation 3, Part 4: performance assessment; Investigation 3 I-Check
Investigation 4, Parts 1-3: notebook entry
Investigation 4, Part 4: performance assessment, Investigation 4 I-Check
Investigation 5, Part 1: performance assessment
Investigation 5, Parts 2-3: notebook entry

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Make observations from several sources to construct an evidence-based account for natural phenomena.

Insects and Plants
TE: Investigation 1, Part 1, pp. 93-102
SE: *Animals and Plants in Their Habitats,* pp. 3-18

Investigation 1, Part 2, pp. 112-115
DR: All about Water Ecosystems (Video) *"Habitat Gallery," "Where Does It Live?" "What Doesn't Belong?" "Organism Match"*

Investigation 2, Part 1, pp. 144-148
Investigation 2, Part 2, pp. 152-158
DR: How Plants Grow (Video)

Investigation 2, Part 3, pp. 165-166
SE: *Flowers and Seeds,* pp. 18-26

Investigation 2, Part 4, pp. 175-178
SE: *How Seeds Travel,* pp. 27-34

Investigation 3, Part 1, pp. 195-196
Investigation 3, Part 2, pp. 201-206
SE: *So Many Kinds, So Many Places*

Disciplinary Core Ideas

There are many different kinds of living things in any area, and they exist in different places on land and in water.

Insects and Plants
TE: Investigation 1, Part 1, pp. 93-102
SE: *Animals and Plants in Their Habitats,* pp. 3-18

Investigation 1, Part 2, pp. 112-115
DR: All about Water Ecosystems (Video) *"Habitat Gallery," "Where Does It Live?" "What Doesn't Belong?" "Organism Match"*

Investigation 2, Part 2, pp. 152-158
DR: How Plants Grow (Video)

Investigation 2, Part 3, pp. 165-166
SE: *Flowers and Seeds,* pp. 18-26

Investigation 2, Part 4, pp. 175-178
SE: *How Seeds Travel,* pp. 27-34

Investigation 3, Part 2, pp. 201-206
SE: *So Many Kinds, So Many Places,* pp. 35-40

Crosscutting Concepts

Systems and System Models
A system is an organized group of related objects or components.

Insects and Plants
TE: Investigation 1, Part 1, pp. 93-102
SE: *Animals and Plants in Their Habitats,* pp. 3-18

Investigation 1, Part 2, pp. 112-115
DR: All about Water Ecosystems (Video) *"Habitat Gallery," "Where Does It Live?" "What Doesn't Belong?" "Organism Match"*

Investigation 3, Part 2, pp. 201-206
SE: *So Many Kinds, So Many Places,* pp. 35-40

Investigation 3, Part 4, pp. 218-224
DR: House and Backyard Insects (Video), Bugs (Video), *"Insect Hunt"*

Investigation 4, Part 4, pp. 270-275
DR: Habitat Havoc

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Investigation 3, Part 3, pp. 209-213 Investigation 3, Part 4, pp. 218-224 **DR:** House and Backyard Insects (Video), Bugs (Video), "*Insect Hunt*" Investigation 4, Part 1, pp. 243-246 Investigation 4, Part 2, pp. 250-255, **SE:** *Shapes and Colors,* pp. 41-45 Investigation 4, Part 3, pp. 261- 266 **SE:** *Insect Life Cycles,* pp. 46-54 Investigation 4, Part 4, pp. 270-275 **DR:** Habitat Havoc Investigation 5, Part 1, pp. 292-295 Investigation 5, Part 2, pp. 299-300 Investigation 5, Part 3, pp. 304-307 **DR:** Insect (Video)	Investigation 3, Part 4, pp. 218-224 **DR:** House and Backyard Insects (Video), Bugs (Video) "*Insect Hunt*" (Online Activity) Investigation 4, Part 4, pp. 270-275 **DR:** Habitat Havoc Investigation 5, Part 2, pp. 299-300 Investigation 5, Part 3, pp. 304-307 **DR:** Insect (Video)	

Additional Science and Engineering Practices Addressed

Asking Questions
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Patterns
Structure and Function
Stability and Change

GRADE 2

Earth's Place in the Universe

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

Performance Expectation 2.ESS2.1

Students who demonstrate understanding can:
Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly, and erosion of rocks, which occurs slowly .Assessment Boundary: Assessment does not include quantitative measurements of timescales.

Pebbles, Sand, and Silt
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: notebook entry
Investigation 2, Part 2: notebook entry
Investigation 2, Part 4: notebook entry, Investigation 4 I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Pebbles, Sand, and Silt
TE: Investigation 1, Part 1, pp. 87-91
Investigation 1, Part 2, pp. 93-97
DR: All about Volcanoes (Video)

Investigation 2, Part 2, pp. 142-147
SE: *The Story of Sand,* pp. 14-21

Investigation 2, Part 4, pp. 159-165
SE: *Rocks Move,* pp. 22-23
DR: All about Landforms (Video)

Disciplinary Core Ideas

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

Pebbles, Sand, and Silt
TE: Investigation 1, Part 1, pp. 87-91
Investigation 1, Part 2, pp. 93-97
DR: All about Volcanoes (Video)

Investigation 2, Part 2, pp. 142-147
SE: *The Story of Sand,* pp. 14-21

Investigation 2, Part 4, pp. 159-165
SE: *Rocks Move,* pp. 22-23
DR: All about Landforms (Video)

Investigation 4, Part 4, pp. 256-257
SE: *Erosion*, pp. 68-78

Crosscutting Concepts

Stability and Change
Things may change quickly or slowly.

Pebbles, Sand, and Silt
TE: Investigation 1, Part 1, pp. 87-91
Investigation 1, Part 2, pp. 93-97
DR: All about Volcanoes (Video)

Investigation 2, Part 2, pp. 142-147
SE: *The Story of Sand,* pp. 14-21

Investigation 2, Part 4, pp. 159-165
SE: *Rocks Move,* pp. 22-23
DR: All about Landforms (Video)

Investigation 4, Part 4, pp. 256-257
SE: *Erosion*, pp. 68-78

Additional Science and Engineering Practices Addressed

Analyzing and Interpreting Data
Constructing Explanations
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Patterns

GRADE 2

Earth's Systems

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

Performance Expectation 2.ESS2.1

Students who demonstrate understanding can:
Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*

Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land. Students could explore these ideas with sand tables or soil and water in large containers. Assessment Boundary: N/A.

Pebbles, Sand, and Silt Module
Investigation 4, Part 4: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Compare multiple solutions to a problem. ***Pebbles, Sand, and Silt*** **TE:** Investigation 4, Part 4, pp. 256-260 **SE:** *Erosion,* pp. 68-78, *Ways to Represent Land and Water,* pp. 79-91	•Wind and water can change the shape of the land. •Because there is always more than one possible solution to a problem, it is useful to compare and test designs. •Developing and using technology has impacts on the natural world. ***Pebbles, Sand, and Silt*** **TE:** Investigation 4, Part 4, pp. 256-260 **SE:** *Erosion, pp. 68-78, Ways to Represent Land and Water,* pp. 79-91	**Stability and Change** Things may change slowly or rapidly. ***Pebbles, Sand, and Silt*** **TE:** Investigation 4, Part 4, pp. 256-257 **SE:** *Erosion,* pp. 68-78

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed

Developing and Using Models,
Scale, Proportion, and Quantity
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Scale, Proportion, and Quantity

GRADE 2

Earth's Systems

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

Performance Expectation 2.ESS2.2

Students who demonstrate understanding can:
Develop a model to represent the shapes and kind of land and bodies of water in an area.

Clarification Statement: Examples could include a diagram, drawing, physical replica, or three-dimensional diorama. Models can be based on photographs, virtual images, or in-person observations. Assessment Boundary: Assessment does not include quantitative scaling in models.

Pebbles, Sand, and Silt Module
Investigation 4, Part 3, notebook entry
Investigation 4, Part 4, notebook entry; Investigation 4 I-Check

Science and Engineering Practices

Developing and Using Models
Develop a model to represent patterns in the natural world.

Pebbles, Sand, and Silt
TE: Investigation 4, Part 3, pp. 250-253
SE: *Where is Water Found?* pp. 50-60, *States of Water,* pp. 61-67

Investigation 4, Part 4, pp. 256-260
SE: *Erosion,* pp. 68-78, *Ways to Represent Land and Water,* pp. 79-91

Disciplinary Core Ideas

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

Pebbles, Sand, and Silt
TE: Investigation 4, Part 4, pp. 256-260
SE: *Erosion,* pp. 68-78, *Ways to Represent Land and Water,* pp. 79-91

Crosscutting Concepts

Patterns
Patterns in the natural world can be observed.

Pebbles, Sand, and Silt
TE: Investigation 4, Part 4, pp. 258-260
SE: *Ways to Represent Land and Water,* pp. 79-91
DR: All About Landforms (Video)

Additional Science and Engineering Practices Addressed

Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Stability and Change
Scale, Proportion, and Quantity

GRADE 2

Earth's Systems

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

Performance Expectation 2.ESS2.3

Students who demonstrate understanding can:
Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Clarification Statement: Information can be obtained through text, media, or in-person observations. Patterns can be observed through identifying where solid water (ice) is found and where liquid water can be located. Assessment Boundary: NA

Pebbles, Sand, and Silt Module
Investigation 4, Part 3: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Obtain information using various texts and media. ***Pebbles, Sand, and Silt*** **TE:** Investigation 4, Part 3, pp. 250-253 **SE:** *Where is Water Found?* pp. 50-60 *States of Water,* pp. 61-67	• Water is found in the ocean, rivers, lakes, and ponds. • Water exists as solid ice and in liquid form. ***Pebbles, Sand, and Silt*** **TE:** Investigation 4, Part 3 **SE:** *Where is Water Found?* pp. 50-60 *States of Water,* pp. 61-67	**Patterns** Patterns in the natural world can be observed. ***Pebbles, Sand, and Silt*** **TE: :** Investigation 4, Part 3 **SE:** *Where is Water Found?* pp. 50-60 *States of Water,* pp. 61-67

Additional Science and Engineering Practices Addressed
Obtaining, Evaluating, and Communicating Information

GRADE 3

Motion and Stability: Forces and Interactions

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

Performance Expectation 3.PS2.1

Students who demonstrate understanding can:

Plan and conduct investigations on the effect of balanced and unbalanced forces on the motion of an object.

Clarification Statement: Examples could include that an unbalanced force on one side of a ball can make it start moving and balanced forces Pushing on a box from opposite sides will not produce any motion at all. Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.

Motion and Matter Module
Investigation 1, Part 1: notebook entry
Investigation 1, Parts 2-3: response sheet; Investigation 1 I-Check
Investigation 2, Part 3: performance assessment

Science and Engineering Practices

Planning and Carrying Out Investigations
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.

Motion and Matter
TE: Investigation 1, Part 1, pp. 94-99
Investigation 1, Part 2, pp. 105-109
Investigation 1, Part 3, pp. 113-115

Investigation 2, Part 3, pp. 151-157

Disciplinary Core Ideas

- 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 quantitative addition of forces is not used at this level.)
- Objects in contact exert forces on each other.

Motion and Matter
TE: Investigation 1, Part 1, pp. 94-101
SE: *Magnetism and Gravity,* pp. 3-7

Investigation 1, Part 2, pp. 105-109
Investigation 1, Part 3, pp. 113-120
SE: *Change of Motion,* pp 10-15
DR: All About Motion and Balance (Video), All About Magnets (Video)

Investigation 2, Part 2, p. 147
DR: "Roller Coaster Builder"

Investigation 2, Part 3, pp. 151-157

Crosscutting Concepts

Cause and Effect
Cause and effect relationships are routinely identified.

Motion and Matter
TE: Investigation 1, Part 1, pp. 94-101
SE: *Magnetism and Gravity,* pp. 3-7

Investigation 1, Part 2, pp. 105-109
Investigation 1, Part 3, pp. 113-120
SE: *Change of Motion,* pp 10-15
DR: All About Motion and Balance (Video), All About Magnets (Video)

Investigation 2, Part 2, p. 147
DR: "Roller Coaster Builder"

Investigation 2, Part 3, pp. 151-157

Additional Science and Engineering Practices Addressed
Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Motion and Stability: Forces and Interactions

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

Performance Expectation 3.PS2.2

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.

Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing (pendulum), object rolling down a ramp from different heights, a ball rolling back and forth in a bowl, and two children on a see-saw. Assessment Boundary: Assessment does not include technical terms such as period and frequency.

Motion and Matter Module

Investigation 1, Part 2: performance assessment
Investigation 2, Part 1: notebook entry
Investigation 2, Part 2: response sheet
Investigation 3, Part 3: notebook entry

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

Motion and Matter
TE: Investigation 1, Part 2, pp. 105-109

Investigation 2, Part 1, pp. 135-139
Investigation 2, Part 2, pp. 142-145
Investigation 2, Part 3, pp. 151-157

Investigation 3, Part 3, pp. 199-202

Disciplinary Core Ideas

- 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).

Motion and Matter
TE: Investigation 1, Part 2, pp. 105-109
SE: *What Scientists Do,* pp. 8-9

Investigation 2, Part 1, pp. 135-139
Investigation 2, Part 2, pp. 142-147
SE: *Patterns of Motion,* pp. 16-17
DR: "Roller Coaster Builder"

Investigation 3, Part 3, pp. 199-205

Crosscutting Concepts

Patterns
Patterns of change can be used to make predictions.

Motion and Matter
TE: Investigation 1, Part 2, pp. 105-109

Investigation 2, Part 1, pp. 135-139
Investigation 2, Part 2, pp. 142-147
SE: *Patterns of Motion,* pp. 16-17
DR: "Roller Coaster Builder"

Investigation 3, Part 3, pp. 199-205

Additional Science and Engineering Practices Addressed

Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Motion and Stability: Forces and Interactions

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

Performance Expectation 3.PS.2.3

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

Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force. Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.

Motion and Matter Module
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment, response sheet

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Ask questions that can be investigated based on patterns such as cause and effect relationships. ***Motion and Matter*** **TE:** Investigation 1, Part 1, pp. 94-101 **SE:** *Magnetism and Gravity,* pp. 3-7 Investigation 1, Part 2, pp. 105-109	•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. ***Motion and Matter*** **TE:** Investigation 1, Part 1, pp. 94-101 **SE:** *Magnetism and Gravity,* pp. 3-7 **DR:** "Magnetic Poles" Investigation 1, Part 2, pp. 105-109 Investigation 1, Part 3, pp. 116 **DR:** All about Magnets (Video)	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Motion and Matter*** **TE:** Investigation 1, Part 1, pp. 94-101 **SE:** *Magnetism and Gravity,* pp. 3-7 **DR:** "Magnetic Poles" (Online Activity) Investigation 1, Part 2, pp. 105-109

Additional Science and Engineering Practices Addressed
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Motion and Stability: Forces and Interactions

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

Performance Expectation 3.PS2.4

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

Clarification Statement: Examples of problems could include a door that will not stay closed or two objects that keep colliding. Assessment Boundary: N/A

Motion and Matter Module
Investigation 3, Part 4: Focus question answer as notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Define a simple problem that can be solved through the development of a new or improved object or tool. ***Motion and Matter*** **TE:** Investigation 3, Part 4, pp. 208-212 **SE**: *Magnets at Work,* pp. 42-45	• 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. • Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. ***Motion and Matter*** **TE:** Investigation 3, Part 4, pp. 208-212 **SE:** *Magnets at Work,* pp. 42-45	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. Other crosscutting concepts may be more appropriate depending on the problem chosen. ***Motion and Matter*** **TE:** Investigation 3, Part 4, pp. 208-212 **SE:** *Magnets at Work,* pp. 42-45

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions

GRADE 3

From Molecules to Organisms: Structure and Function

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

Performance Expectation 3LS1.1

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

Clarification Statement: Changes different organisms go through during their life form a pattern. Organism life cycles that can be studied include mealworms, dandelions, lima beans, dogs, and butterflies. Assessment Boundary: Assessment includes animal and plant life cycles. Plant life cycles are limited to those of flowering plants. Assessment does not include details of human reproduction or microscopic organisms.

Structures of Life Module
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: response sheet
Investigation 1, Part 3: performance assessment, Investigation 1 I-Check
Investigation 2, Part 1: response sheet
Investigation 2, Part 2: notebook entry

Science and Engineering Practices

Developing and Using Models 1
Develop models to describe phenomena.

Structures of Life
TE: Investigation 1, Part 1, pp. 99-107
SE: *The Reason for Fruit, pp. 3-7*
DR: eBook videoclips, p. 99

Investigation 1, Part 2, pp. 112-119
DR: “Plant Basic Needs” tutorial

Investigation 1, Part 3, pp. 122-125

Investigation 2, Part 1, pp. 157-162
SE: *Germination,* pp. 22-25

Investigation 2, Part 2, pp. 166-173
SE: *Life Cycles,* pp. 26-33
DR: How Plants Get Food (Video);
All about Animal Life Cycles (Video);
“Structure and Function of Plants”

Disciplinary Core Ideas

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

Structures of Life
TE: Investigation 1, Part 1, pp. 99-107
SE: *The Reason for Fruit, pp. 3-7*
DR: eBook videoclips, p. 99

Investigation 2, pp. 112-119
DR: “Plant Basic Needs” tutorial

Investigation 1, Part 3, pp. 122-125

Investigation 2, Part 1, pp. 157-162
SE: *Germination,* pp. 22-25

Investigation 2, Part 2, pp. 166-173
SE: *Life Cycles,* pp. 26-33
DR: How Plants Get Food (Video);
All about Animal Life Cycles (Video);
“Structure and Function of Plants”

Crosscutting Concepts

Patterns
Patterns of change can be used to make predictions.

Structures of Life
TE: Investigation 1, Part 1
SE: *The Reason for Fruit, pp. 3-7*
DR: eBook videoclips, p. 99

Investigation 1, Part
DR: “Plant Basic Needs” tutorial

Investigation 2, Part 1, pp. 157-162
SE: *Germination,* pp. 22-25

Investigation 2, Part 2, pp. 166-173
SE: *Life Cycles,* pp. 26-33
DR: How Plants Get Food (Video);
All about Animal Life Cycles (Video);
“Structure and Function of Plants”

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Cause and Effect
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 3LS2.1

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

Clarification Statement: Arguments could include examples of group behavior such as division of labor in a bee colony, flocks of birds staying together to confuse or intimidate predators, or wolves hunting in packs to more efficiently catch and kill prey. When animals are no longer part of their group, they may not survive as well. Assessment Boundary: N/A

Structures of Life Module
Investigation 3, Part 3: research animal behavior

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct an argument from evidence, data, and/or a model. ***Structures of Life*** **TE:** Investigation 3, Part 3, pp. 246, 248-249 **SE:** *Adaptations,* pp. 47-48 **DR:** All About Animal Behavior and Communication (Video)	•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. ***Structures of Life*** **TE:** Investigation 3, Part 3, pp. 246, 248-249 **SE:** *Adaptations,* pp. 47-48 **DR:** All About Animal Behavior and Communication (Video)	**Cause and Effect** Cause and effect relationships are routinely used to explain change. ***Structures of Life*** **TE**: Investigation 3, Part 3, pp. 246, 248-249 **SE:** *Adaptations,* pp. 47-48 **DR:** All About Animal Behavior and Communication (Video)

Additional Science and Engineering Practices Addressed
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 3.LS3.1

Students who demonstrate understanding can:

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms.

Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans. Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.

Structures of Life Module

Investigation 2, Part 2: notebook entry
Investigation 3, Part 2: notebook entry
Investigation 3, Part 3: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze and interpret data to make sense of phenomena using logical reasoning. ***Structures of Life*** **TE:** Investigation 2, Part 2, pp. 170-171, p. 173 **DR:** All about Animal Life Cycles (Video) Investigation 3, Part 2, pp. 230-237 **DR:** "Walking Stick Survival" Investigation 3, Part 3, p. 246 **DR**: All about Animal Behavior (Video)	•Many characteristics of organisms are inherited from their parents. •Different organisms vary in how they look and function because they have different inherited information. ***Structures of Life*** **TE:** Investigation 2, Part 2, pp. 170-171, p. 173 **DR:** All about Animal Life Cycles (Video) Investigation 3, Part 2, pp. 230-237 **DR:** "Walking Stick Survival" Investigation 3, Part 3, p. 246 **DR**: All about Animal Behavior (Video) Investigation 3, Part 4, p. 257	**Patterns** Similarities and differences in patterns can be used to sort and classify natural phenomenon. ***Structures of Life*** **TE:** Investigation 2, Part 2, pp. 170-171, p. 173 **DR:** All about Animal Life Cycles (Video) Investigation 3, Part 2, pp. 230-237 **DR:** "Walking Stick Survival"

Additional Science and Engineering Practices Addressed

Developing and Using Models
Constructing Explanations and Designing Solutions

Additional Crosscutting Concepts Addressed

Cause and Effect

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 3.LS3.2

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

Clarification Statement: Examples of the environment affecting a trait could include that normally tall plants grown with insufficient water are stunted; a pet dog that is given too much food and little exercise may become overweight; and animals who teach their offspring skills like hunting. Assessment Boundary: N/A

Structures of Life Module
Investigation 3, Part 3: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Use evidence (e.g., observations, patterns) to support an explanation. ***Structures of Life*** **TE**: Investigation 3, Part 3, 242-250 **SE:** *Life on Earth,* pp. 50-63 **DR:** All about Animal Behavior and Communication (Video)	•Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. •The environment also affects the traits that an organism develops. ***Structures of Life*** **TE**: Investigation 3, Part 3, pp. 242-250 **SE:** *Life on Earth,* pp. 50-63 **DR:** All about Animal Behavior and Communication (Video)	**Cause and Effect** Cause and effect relationships are routinely identified and used to explain changes. ***Structures of Life*** **TE:** Investigation 3, Part 3, pp. 242-250 **SE:** *Life on Earth,* pp. 50-63 **DR:** All about Animal Behavior and Communication (Video)

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Developing and Using Models
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns

GRADE 3

Biological Unity and Diversity

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

Performance Expectation 3.LS4.1

Students who demonstrate understanding can:
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Clarification Statement: Examples of data could include type, size, and distribution of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.
Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.

Structures of Life Module
Investigation 4, Part 2: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze and interpret data to make sense of phenomena using logical reasoning. **TE:** Investigation 4, Part 2, pp. 311-314 **SE:** *Barn Owls*, pp. 78-80; *Fossils,* pp. 81-88 **DR***:* All About Fossils (Video)	•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. **TE:** Investigation 4, Part 2, pp. 311-314 **SE:** *Barn Owls*, pp. 78-80; *Fossils,* pp. 81-88 **DR***:* All About Fossils (Video)	**Scale, Proportion, and Quantity** Observable phenomena exist from very short to very long time periods. **TE:** Investigation 4, Part 2 **SE:** *Barn Owls*, pp. 78-80; *Fossils,* pp. 81-88 **DR***:* All About Fossils (Video)

Additional Science and Engineering Practices Addressed
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

GRADE 3

Biological Unity and Diversity

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

Performance Expectation 3.LS4.2

Students who demonstrate understanding can:

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving and reproducing.

Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring. Assessment Boundary: N/A

Structures of Life Module
Investigation 3, Parts 1 and 2: notebook entry
Investigation 3, Part 3: performance assessment; Investigation 3 I-Check

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Use evidence (e.g., observations, patterns) to construct an explanation

Structures of Life
TE: Investigation 3, Part 1, pp. 208-211

Investigation 3, Part 2, pp. 231-238
DR: All about Animal Adaptations (Video)
"Walking Stick Survival"

Investigation 3, Part 3, pp. 242-250
DR: All about Animal Behavior and Communication (Video)

Disciplinary Core Ideas

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

Structures of Life
TE: Investigation 3, Part 1, pp. 208-211

Investigation 3, Part 2, pp. 231-238
DR: "Walking Stick Survival"

Investigation 3, Part 3, pp. 242-250
DR: All about Animal Behavior and Communication (Video)

Crosscutting Concepts

Cause and Effect
Cause and effect relationships are routinely identified, tested, or used to explain change

Structures of Life
TE: Investigation 3, Part 2, pp. 231-238
DR: All about Animal Adaptations (Video)
"Walking Stick Survival"

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change

GRADE 3

Biological Unity and Diversity

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

Performance Expectation 3.LS4.3

Students who demonstrate understanding can:

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other. At no time should animals be put in danger to collect evidence.
Assessment Boundary: N/A

Structures of Life Module
Investigation 1, Part 2: response sheet
Investigation 1, Part 4: notebook entry, Investigation 1 I-Check
Investigation 3, Part 2: notebook entry
Investigation 3, Part 3: performance assessment
Investigation 3, Part 4: response sheet, Investigation 3 I-Check

Science and Engineering Practices

Engaging in Argument from Evidence
Construct an argument with evidence

Structures of Life
TE: Investigation 1, Part 2, pp. 118-119
SE: *The Most Important Seed,* pp. 8-11

Investigation 1, Part 4, pp. 134-139
SE: *Nature Journal How Seeds Travel,* pp. 16-21

Investigation 3, Part 2, pp. 233-238
DR: "Walking Stick Survival"

Investigation 3, Part 3, pp. 247-248
SE: *Life on Earth,* pp. 50-63

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-79
DR: "Where Does It Live?" "What Doesn't Belong?" "Organism Match," "Habitat Gallery"

Disciplinary Core Ideas

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
- Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful.

Structures of Life
TE: Investigation 1, Part 2,
SE: *The Most Important Seed,* p. 8-11

Investigation 1, Part 4
SE: *Nature Journal How Seeds Travel,* pp. 16-21

Investigation 3, Part 2, pp. 233-238
DR: "Walking Stick Survival"

Investigation 3, Part 3, pp. 247-248
SE: *Life on Earth,* pp. 50-63

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-79
DR: "Where Does It Live?" "What Doesn't Belong?" "Organism Match," "Habitat Gallery"

Crosscutting Concepts

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

Structures of Life
TE: Investigation 1, Part 2,
SE: *The Most Important Seed,* pp. 8-11

Investigation 1, Part 4, pp. 134-139
SE: *Nature Journal How Seeds Travel,* pp. 16-21

Investigation 3, Part 2, pp. 233-238
DR: "Walking Stick Survival"

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-79
DR: "Where Does It Live?" "What Doesn't Belong?" "Organism Match," "Habitat Gallery"

Additional Science and Engineering Practices Addressed
Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Biological Unity and Diversity

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

Performance Expectation 3.LS4.4

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.*

Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms. Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.

Structures of Life Module
Investigation 1, Part 2: notebook entry
Investigation 3, Part 4: response sheet

Science and Engineering Practices

Engaging in Argument from Evidence
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.

Structures of Life
TE: Investigation 1, Part 2, pp. 118-119
SE: *The Most Important Seed,* pp. 8-11

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-69

Disciplinary Core Ideas

- 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.
- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

Structures of Life
TE: Investigation 1, Part 2, pp. 118-119
SE: *The Most Important Seed,* pp. 8-11

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-69

Crosscutting Concepts

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

Structures of Life
TE: Investigation 3, Part 2† See p. 224

Investigation 3, Part 4, pp. 254-261
SE: *A Change in the Environment,* pp. 66-69

†The term environment is introduced in Investigation 3, Part 2 and is referred to as a system from that point on.

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed
Constructing Explanations and Designing Solutions

Additional Crosscutting Concepts Addressed
Cause and Effect
Stability and Change

GRADE 3

Earth's Systems

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

Performance Expectation 3.ESS2.1

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

Clarification Statement: Examples of data at this grade level could include average temperature, precipitation, and wind direction. Assessment Boundary: Assessment of graphical displays is limited to frequency tables, line plots, pictographs, and single bar graphs. Students are not expected to calculate averages but simply to represent them in graphical form.

Water and Climate Module
Investigation 3, Part 1: performance assessment
Investigation 4, Part 1: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. ***Water and Climate*** **TE:** Investigation 3, Part 1, pp. 208-215 **SE:** *Studying Weather,* pp. 30-36 **DR:** All About Meteorology (Video), "Weather Grapher," "National Weather Service," "Weather Underground/ Weather Channel" or other weather information services Investigation 4, Part 1, pp. 265-269	•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. ***Water and Climate*** **TE:** Investigation 3, Part 1, pp. 208-215 **DR:** All About Meteorology (Video), "Weather Grapher," "National Weather Service," "Weather Underground/ Weather Channel" or other weather information services Investigation 4, Part 1, pp. 265-269	**Patterns** Patterns of change can be used to make predictions. ***Water and Climate*** **TE:** Investigation 3, Part 1, pp. 208-215 **DR:** All About Meteorology (Video) "Weather Grapher," "Weather Underground/Weather Channel" or other weather information services Investigation 4, Part 1, pp. 265-269

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Earth's Systems

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

Performance Expectation 3.ESS2.2

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

Clarification Statement: Information could include hours of daylight, amount of precipitation, temperature, seasons, and wind. Descriptions could include the use of frequency tables, line plots, pictographs, and single bar graphs. Climate data should include weather conditions over multiple years. Assessment Boundary: Assessments do not include causes of seasons.

Water and Climate Module
Investigation 4, part 2: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Obtain and combine information from books and other reliable media to explain phenomena. ***Water and Climate*** **TE**: Investigation 4, Part 2, pp. 272-277 **SE**: *Climate Regions,* pp. 48-54 **DR:** All about Climate and Seasons (Video), "Climate Regions Map"	•Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years to centuries. ***Water and Climate*** **TE**: Investigation 4, Part 2, pp. 272-277 **SE**: *Climate Regions,* pp. 48-54 **DR:** All about Climate and Seasons (Video), "Climate Regions Map"	**Patterns** Patterns of change can be used to make predictions. ***Water and Climate*** **TE**: Investigation 4, Part 2, pp. 272-277 **SE**: *Climate Regions,* pp. 48-54 **DR:** All about Climate and Seasons (Video), "Climate Regions Map"

Additional Science and Engineering Practices Addressed
Constructing Explanations and Designing Solutions
Additional Crosscutting Concepts Addressed
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 3

Earth and Human Activity

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

Performance Expectation 3.ESS3.1

Students who demonstrate understanding can:

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind/hail resistant roofs/windows, textured walking surfaces for ice, tornado shelters, and lighting rods. While earthquakes, volcanoes, and tsunamis are natural hazards they are not caused by weather phenomenon. Assessment Boundary: Assessments are limited to weather-related hazards only.

Water and Climate Module

Investigation 4, Part 3: notebook entry, Investigation 4 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence 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. ***Water and Climate*** **TE:** Investigation 4, Part 3, pp. 281-287 **SE:** *Wetlands for Flood Control,* pp. 55-60; *Conserving Water during Droughts,* pp. 61-62 **DR:** Come a Tide (Video), Floods (Video)	•A variety of natural hazards result from natural processes. •Humans cannot eliminate natural hazards but can take steps to reduce their impact. •Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). ***Water and Climate*** **TE:** Investigation 4, Part 3, pp. 281-287 **SE:** *Wetlands for Flood Control,* pp. 55-60; *Conserving Water during Droughts,* pp. 61-62 **DR:** Come a Tide (Video), Floods (Video)	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Water and Climate*** **TE:** Investigation 4, Part 3, pp. 281-287 **SE:** *Wetlands for Flood Control,* pp. 55-60; *Conserving Water during Droughts,* pp. 61-62 **DR:** Come a Tide (Video), Floods (Video)

Additional Science and Engineering Practices Addressed

Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

GRADE 4

Energy

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

Performance Expectation 4.PS3.1

Students who demonstrate understanding can:

Use evidence to construct an explanation relating the speed of an object to the energy of that object.

Clarification Statement: Energy can be moved from place to place by moving objects (e.g. wind moving a sail then moving a boat, throwing a ball, or paddling a boat). As objects increase in speed they possess more energy (e.g. ball rolling down a ramp). Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object (acceleration) or on any precise, quantitative, or complete definition of energy.

Energy Module
Investigation 4, Part 2: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Use evidence (e.g., measurements, observations, patterns) to construct an explanation. ***Energy*** **TE:** Investigation 4, Part 2, pp. 300- 306	• The faster a given object is moving, the more energy it possesses. ***Energy*** **TE:** Investigation 4, Part 2, pp. 300-306 **SE:** *What Causes Change of Motion?* pp. 74-77; *Force and Energy,* pp. 79-82; *Potential and Kinetic Energy at Work,* pp. 83-85	**Patterns** Patterns can be used as evidence to support an explanation. ***Energy*** **TE**: Investigation 4, Part 2, pp. 300-306

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect

GRADE 4

Energy

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

Performance Expectation 4.PS3.2

Students who demonstrate understanding can:
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Clarification Statement: Light, heat, sound, and electric currents transfer energy. Examples of this can include sound from a radio, light from A flashlight, the sun heating a window pane, and currents to electronic devices. When energy is transferred it can stay in the same form or change forms. Assessment Boundary: Assessment does not include quantitative measurements of energy or the difference between transferring and transforming energy.

Energy Module
Investigation 1, Part 1: notebook entry
Investigation 1, Part 3: response sheet
Investigation 3, Part 1: response sheet, notebook entry
Investigation 4, Part 1: notebook entry
Investigation 4, Part 2: notebook entry
Investigation 4, Part 3: response sheet, notebook entry
Investigation 5, Part 1: notebook entry
Investigation 5, Part 2: notebook entry
Investigation 5, Part 3: performance assessment

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations to produce data to serve as the basis for evidence for an explanation of a phenomena or test a design solution.

TE: Investigation 1, Part 1, pp. 120-126, 129
Investigation 1, Part 3, pp. 150-159
Investigation 3, Part 1, pp. 245-251
Investigation 4, Part 1, pp. 291-297
Investigation 4, Part 2, pp. 300-304
Investigation 4, Part 3, pp. 310-315
Investigation 5, Part 1, pp. 345-351
Investigation 5, Part 3, pp. 377-381

Disciplinary Core Ideas

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

TE: Investigation 1, Part 1, pp. 120-129
SE: *Edison Sees the Light,* pp. 3-7
DR: “Lighting a Bulb” and “Flow of Electricity”

Investigation 1, Part 2, pp. 145-146
SE: *Energy Sources,* pp. 8-12

Investigation 1, Part 3, pp. 150-159
SE: *Series and Parallel Circuits,* pp. 13-18
DR: “Tutorial: Series and Parallel Circuits” (Online Activity)

Crosscutting Concepts

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

TE: Investigation 1, Part 1, pp. 120-129
Investigation 1, Part 3, pp. 150-159

Investigation 3, Part 1, pp. 245-251
SE: *Electricity Creates Magnetism,* pp. 44-46

Investigation 4, Part 1, pp. 291-297
SE: *Energy,* pp. 65-73

Investigation 4, Part 2, pp. 300-306
SE: *What Causes Change of Motion?* pp. 74-77

Investigation 4, Part 3, pp. 310-322
SE: *Bowling,* p. 78, *Force and Energy,* pp. 79-82, *Potential and Kinetic Energy at Work,* pp. 83-85
DR: All about the Transfer of Energy (Video)

Investigation 5, Part 1, pp. 345-357
SE: *Waves,* pp. 86-90, *More about Sound,* pp. 91-99
DR: Real World Science: Sound (Video), All about Waves (Video)

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	Investigation 3, Part 1, pp. 245-251 **SE:** *Electricity Creates Magnetism,* pp. 44-46 Investigation 4, Part 1, pp. 291-297 **SE:** *Energy,* pp. 65-73 Investigation 4, Part 2, pp. 300-306 **SE:** *What Causes Change of Motion?* pp. 74-77 Investigation 4, Part 3, pp. 310-322, **SE:** *Bowling,* p. 78, *Force and Energy,* pp. 79-82, *Potential and Kinetic Energy at Work,* pp. 83-85 **DR:** All about the Transfer of Energy (Video) Investigation 5, Part 1, pp. 345-357 **SE:** *Waves,* pp. 86-90, *More about Sound,* pp. 91-99 **DR:** Real World Science: Sound (Video), All about Waves (Video) Investigation 5, Part 2, p. 366 **DR:** All about Light (Video) Investigation 5, Part 3, pp. 377-383 **SE:** *Alternative Sources of Electricity,* pp. 114-119	Investigation 5, Part 2, p. 366 Investigation 5, Part 3, **SE:** *Alternative Sources of Electricity,* pp. 114-119

Additional Science and Engineering Practices Addressed
Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Stability and Change
Cause and Effect
Systems and System Models

GRADE 4

Energy

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

Performance Expectation 4.PS3.3

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

Clarification Statement: Collisions include any interactions between objects when they come in contact with one another and transfer energy. Emphasis is on the change in energy due to the change in speed, not forces, as objects interact. Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object (acceleration) or quantitative measurements of energy.

Energy Module
Investigation 4, Part 3: response sheet, Investigation 4 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. ***Energy*** **TE:** Investigation 4, Part 3, pp. 310-315	• 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. • When objects collide, the contact forces transfer energy so as to change the objects' motions. ***Energy*** **TE:** Investigation 4, Part 3, pp. 300-322 **SE:** *Bowling,* p. 78; *Force and Energy,* pp. 79-82; *Potential and Kinetic Energy at Work,* pp. 83-85 **DR:** All about the Transfer of Energy (Video)	**Energy and Matter** Energy can be transferred in various ways and between objects. ***Energy*** **TE:** Investigation 4, Part 3, pp. 300-322 **SE:** *Bowling,* p. 78; *Force and Energy,* pp. 79-82; *Potential and Kinetic Energy at Work,* pp. 83-85 **DR:** All about the Transfer of Energy (Video)

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns

GRADE 4

Energy

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

Performance Expectation 4.PS3.4

Students who demonstrate understanding can:

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*

Clarification Statement: Examples of devices could include mousetrap cars; rubber band-powered vehicles; electric circuits that convert electrical energy into light, sound, or motion energy of a vehicle; and a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device. Assessment Boundary: N/A

Energy Module

Investigation 1, Part 3: response sheet
Investigation 1, Part 4: performance assessment; Investigation 1 I-Check
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check
Investigation 5, Part 3: performance assessment; Posttest

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Apply scientific ideas to solve design problems. **TE:** Investigation 1, Part 3,† pp. 150-159 Investigation 1, Part 4, pp. 163-165; pp. 174-175 Investigation 3, Part 3, pp. 264-276 Investigation 5, Part 3, pp. 377- 383 †*Investigation 1, Part 3 provides background knowledge for Part 4.*	• Energy can 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. • The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. • Possible solutions to a problem are limited by available materials and resources (constraints). 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. • The success of a designed solution is determined by considering the desired features of a solution (criteria). • Engineers improve existing technologies or develop new ones. **TE:** Investigation 1, Part 3 , pp. 150-159 **SE:** *Series and Parallel Circuits,* pp. 13-18 **DR:** *Series and Parallel Circuits* Investigation 1, Part 4, pp. 163-175 **SE:** *Science Practices,* p. 19; *Engineering Practices,* p. 20; *Thinking Like an Engineer,* pp. 21-24 Investigation 3, Part 3, pp. 264-276 **SE:** *Morse Gets Clicking,* pp. 58-64 Investigation 5, Part 3, pp. 377-383 **SE:** *Alternative Sources of Energy,* pp. 114-119	**Energy and Matter** Energy can be transferred in various ways and between objects. **TE:** Investigation 1, Part 3 , pp. 150-159 **SE:** *Series and Parallel Circuits,* pp. 13-18 **DR:** *Series and Parallel Circuits* Investigation 1, Part 4, pp. 163-175 **SE:** *Science Practices,* p. 19; *Engineering Practices,* p. 20; *Thinking Like an Engineer,* pp. 21-24 Investigation 3, Part 3, pp. 264-276 **SE:** *Morse Gets Clicking,* pp. 58-64 Investigation 5, Part 3, pp. 377-383 **SE:** *Alternative Sources of Energy,* pp. 114-119

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed

Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect; Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 4.PS4.1

Students who demonstrate understanding can:

Develop and use a model of waves to describe patterns in terms of amplitude and wavelength, and to show that waves can cause objects to move.

Clarification Statement: Examples of models could include diagrams, analogies, and physical models using items like stringed beads, rubber bands, or yarn to illustrate wavelength and amplitude of waves. Examples of wave patterns that cause objects to move up and down or side to side could include the vibrating patterns associated with sound, the vibrating patterns of seismic waves produced by earthquakes.
Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.

Energy Module
Investigation 5, Part 1: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model using an analogy, example, or abstract representation to describe a scientific principle.

Energy
TE: Investigation 5, Part 1, pp. 345-357

Disciplinary Core Ideas

- 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 a beach.
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).

Energy
TE: Investigation 5, Part 1, pp. 345-357
SE: *Waves,* pp. 86-90*; More about Sound,* pp. 91-99
DR: Sound Energy (Video), Waves (Video), Real World Science: Sound (Video), All about Waves (Video)

Crosscutting Concepts

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

Energy
TE: Investigation 5, Part 1, pp. 345-357
SE: *Waves,* pp. 86-90*; More about Sound,* pp. 91-99
DR: Sound Energy (Video), Waves (Video), Real World Science: Sound (Video), All about Waves (Video)

Additional Science and Engineering Practices Addressed

Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Energy and Matter
Cause and Effect
Systems and System Models

GRADE 4

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 4.PS4.2

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

Clarification Statement: Models would identify components such as the source of the light, objects that are seen, the path of the light, and the eye. Models could be used to investigate what happens when one of the components changes (Example: Close the eyes, block the light, or change the light path). Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.

Energy Module
Investigation 5, Part 2: response sheet; Post test

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Develop a model to describe phenomena. ***Energy*** **TE:** Investigation 5, Part 2, pp. 361-367	• An object can be seen when light reflected from its surface enters the eyes. ***Energy*** **TE**: Investigation 5, Part 2, pp. 361-372 **SE:** *Light Interactions,* pp. 100-105; *Throw a Little Light on Sight,* pp. 106-110; *More Light on the Subject,* pp. 111-113 **DR:** All about Light (Video), "Reflected Light," "Tutorial: Reflection," "Colored Light," Virtual Investigation: Color"	**Cause and Effect** Cause and effect relationships are routinely identified. ***Energy*** **TE**: Investigation 5, Part 2, pp. 361- **SE:** *Light Interactions,* pp. 100-105; *Throw a Little Light on Sight,* pp. 106-110; *More Light on the Subject,* pp. 111-113 **DR:** "Reflected Light," "Tutorial: Reflection," All about Light (Video)

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Energy and Matter
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 4.PS4.3

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

Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, QR codes, barcodes, and using Morse code to send text. Assessment Boundary: Assessment does not include creating or writing digital code.

Energy Module
Investigation 3, Part 3

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. ***Energy*** **TE:** Investigation 3, Part 3†, pp. 264-271 †Students need knowledge of electromagnetism (Investigation 3, Parts 1 and 2) to successfully design a telegraph.	• 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. • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. ***Energy*** **TE:** Investigation 3, Part 3†, pp. 264-271 **SE:** *Morse Gets Clicking,* pp. 58-64	**Patterns** Similarities and differences in patterns can be used to sort and classify designed products. ***Energy*** **TE:** Investigation 3, Part 3†, pp. 264-271

***** Asterisk denotes emphasis on engineering practices.

Additional Science and Engineering Practices Addressed
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Cause and Effect
Systems and System Models

GRADE 4

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 4.LS1.1

Students who demonstrate understanding can:

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.

Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.

Environments Module

Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 1, Part 3: notebook entry
Investigation 2, Part 2: notebook entry
Investigation 2, Part 4: response sheet
Investigation 3, Part 1: performance assessment
Investigation 4, Part 1: performance assessment
Investigation 4, Part 3: notebook entry; Post test

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct an argument with evidence, data, and/or a model.	•Plants and animals have both internal and External structures that serve various functions in growth, survival, behavior, and reproduction.	**Structure and Function** Substructures have shapes and parts that serve functions.
Environments **TE:** Investigation 4, Part 1, pp. 299-313 **SE:** *Range of Tolerance,* pp. 91-92; *How Organisms Depend on One Another,* pp. 93-95	***Environments*** **TE:** Investigation 1, Part 1, pp. 100-104, 110-116 **SE:** *Darkling Beetles,* pp. 102-105 Investigation 1, Part 2, pp. 120-127 **SE:** *Isopods,* pp. 16-17 Investigation 1, Part 3, pp. 141-144 Investigation 2, Part 2, pp. 185-188 Investigation 2, Part 4, pp. 206-211 **DR:** Animal Language and Communication (Video), "Animal Ears and Hearing," All about Senses: "Sense of Hearing" (Video) Investigation 3, Part 1, pp. 241-242 **SE:** *Brine Shrimp,* p. 58 Investigation 4, Part 1, pp. 299-313 **SE:** *Range of Tolerance,* pp. 91-92; *How Organisms Depend on One Another,* pp. 93-95 Investigation 4, Part 3, pp. 327-330 **SE:** *Variation and Selection,* pp. 79-85 **DR:** All about Plant Adaptations (Video)	***Environments*** **TE:** Investigation 1, pp. 100-104, 110-116 **SE:** *Darkling Beetles,* pp. 102-105 Investigation 1, Part 2, pp. 120-127 **SE:** *Isopods,* pp. 16-17 Investigation 1, Part 3, pp. 141-144 Investigation 2, Part 2, pp. 185 – 188 Investigation 2, Part 4, pp. 206-211 **DR:** Animal Language and Communication (Video), "Animal Ears and Hearing," All about Senses: "Sense of Hearing" (Video) Investigation 3, Part 1, pp. 241-242 **SE:** *Brine Shrimp,* p. 58 Investigation 4, Part 3, pp. 327-330 **SE:** *Variation and Selection,* pp. 79-85 **DR:** All about Plant Adaptations (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Model; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect; Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 4.LS1.2

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.

Clarification Statement: Emphasis is on systems of information transfer. Examples of response to stimuli include a dog is hot and lies in the shade, a rabbit hears a noise and runs away ,and a person is cold so they put on a jacket. Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.

Environments Module
Investigation 1, Part 1: notebook entry
Investigation 2, Part 4: response sheet

Science and Engineering Practices

Developing and Using Models
Use a model to test interactions concerning the functioning of a natural system.

Environments
TE: Investigation 1, Part 1, pp. 100-104, 110-116

Investigation 2, Part 4, pp. 206-211
SE: *Animal Sensory Systems,* pp. 48-54; *Saving Murrelets through Mimicry,* pp. 55- 57
DR: Animal Language and Communication (Video), "Animal Ears and Hearing," All about Senses: "Sense of Hearing" (Video)

Disciplinary Core Ideas

- 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.

Environments
TE: Investigation 1, Part 1, pp. 100-116
SE: *Two Terrestrial Environments,* pp. 3-12
DR: Deserts (Video)

Investigation 2, Part 4, pp. 206-211
SE: *Animal Sensory Systems,* pp. 48-54; *Saving Murrelets through Mimicry,* pp. 55-57
DR: Animal Language and Communication (Video), "Animal Ears and Hearing," All about Senses: "Sense of Hearing" (Video)

Crosscutting Concepts

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

Environments
TE: Investigation 2, Part 4, 206-211
SE: *Animal Sensory Systems,* pp. 48-54; *Saving Murrelets through Mimicry,* pp. 55-57
DR: Animal Language and Communication (Video), "Animal Ears and Hearing," All about Senses: "Sense of Hearing" (Video)

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Cause and Effect
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Earth's Place in the Universe

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

Performance Expectation 4.ESS1.1

Students who demonstrate understanding can:

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock. Assessment Boundary: Assessment does not include specific knowledge or memorization of specific rock formation and layers. Assessment is limited to relative time.

Soils, Rocks, and Landforms Module
Investigation 2, Part 4: notebook entry

Environments Module
Investigation 4, Part 2

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Identify the evidence that supports particular points in an explanation.

Soils, Rocks, and Landforms
TE: Investigation 2, Part 4, pp. 193-202
SE: *Sedimentary Rocks,* pp. 69-70; *Fossils Tell a Story,* pp. 23-26 , *Pieces of a Dinosaur Puzzle,* pp. 27-30
DR: Fossils (Video), "Tutorial: Fossils," "Tutorial: Soil Formation"

Environments
TE: Investigation 4, Part 2, pp. 322-323
SE: *Animals from the Past,* pp. 96-101

Disciplinary Core Ideas

- 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.

Soils, Rocks, and Landforms
TE: Investigation 2, Part 4, pp. 193-202
SE: *Fossils Tell a Story,* pp. 23-26; *Pieces of a Dinosaur Puzzle,* pp. 27-30
DR: Fossils (Video), "Tutorial: Fossils," "Tutorial: Soil Formation"

Environments
TE: Investigation 4, Part 2, pp. 322-323
SE: *Animals from the Past,* pp. 96-101

Crosscutting Concepts

Patterns
Patterns can be used as evidence to support an explanation.

Soils, Rocks, and Landforms
TE: Investigation 2, Part 4, pp. 193-202
SE: *Fossils Tell a Story,* pp. 23-26
DR: Fossils (Video), "Tutorial: Fossils"

Environments
TE: Investigation 4, Part 2, pp.322-323
SE: *Animals from the Past,* pp.96-101

Additional Science and Engineering Practices Addressed

Developing and Using Models
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Cause and Effect

GRADE 4

Earth's Systems

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

Performance Expectation 4.ESS2.1

Students who demonstrate understanding can:

Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion.

Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow. Assessment Boundary: Assessment is limited to a single form of weathering or erosion.

Soils, Rocks, and Landforms Module
Investigation 1, Part 2: response sheet
Investigation 1, Part 3: performance assessment
Investigation 2, Part 1: notebook entry
Investigation 2, Part 2: performance assessment
Investigation 2, Part 3: response sheet; Investigation 2 I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
With guidance, plan and conduct an investigation with peers.

Soils, Rocks, and Landforms
TE: Investigation 1, Part 2, pp. 113-119
Investigation 1, Part 3, pp. 123-127

Investigation 2, Part 1, pp. 162-169
Investigation 2, Part 2, pp. 173-180
Investigation 2, Part 3, pp. 186-189

Disciplinary Core Ideas

- 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.

Soils, Rocks, and Landforms
TE: Investigation 1, Part 2, pp. 113-119

Investigation 1, Part 3, pp. 123-133
SE: *Weathering,* pp. 6-8
DR: Weathering and Erosion (Video)

Investigation 2, Part 1 , pp. 162-169
SE: *Erosion and Deposition,* pp. 9-14

Investigation 2, Part 2, pp. 173-182
SE: *Landforms Photo Album,* pp. 15-22
DR: Weathering and Erosion (Video), Chapters 5 and 7, optional; "Tutorial: Stream Tables: Slope and Flood"

Investigation 2, Part 3, pp. 186-189
DR: "Stream Tables"

Crosscutting Concepts

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

Soils, Rocks, and Landforms
TE: Investigation 1, Part 2, pp. 113-119
Investigation 1, Part 3, pp. 123-133
SE: *Weathering,* pp. 6-8
DR: Weathering and Erosion (Video)

Investigation 2, Part 1, pp. 162-169
SE: *Erosion and Deposition,* pp. 9-14

Investigation 2, Part 2, pp. 173-182
SE: *Landforms Photo Album,* pp. 15-22
DR: Weathering and Erosion (Video), Chapters 5 and 7, optional; "Tutorial: Stream Tables: Slope and Flood"

Investigation 2, Part 3, pp. 186-189
DR: "Stream Tables"

Additional Science and Engineering Practices Addressed

Asking Questions; Developing and Using Models; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns; Stability and Change; Systems and System Models; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Earth's Systems

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

Performance Expectation 4.ESS2.2

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

Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes. Assessment Boundary: N/A

Soils, Rocks, and Landforms Module
Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment; Investigation 3 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze and interpret data to make sense of phenomena using logical reasoning. ***Soils, Rocks, and Landforms*** **TE:** Investigation 3, Part 1, pp. 221-228 **SE:** *Topographic Maps,* pp. 31-33 Investigation 3, Part 2, pp. 232-240 **DR:** "Topographer" Investigation 3, Part 3, pp. 244-249 **DR:** Mount St. Helens Impact (Video)	• 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 where people live and in other areas of Earth. ***Soils, Rocks, and Landforms*** **TE:** Investigation 3, Part 1, pp. 221-228 **SE:** *Topographic Maps,* pp. 31-33 Investigation 3, Part 2, pp. 232-240 **SE:** *The Story of Mount Shasta,* pp. 34-37 Investigation 3, Part 3, pp. 244-249 **DR:** Mount St. Helens Impact (Video)	**Patterns** Patterns can be used as evidence to support an explanation. ***Soils, Rocks, and Landforms*** **TE:** Investigation 3, Part 3, pp. 244-249 **DR:** Mount St. Helens Impact (Video)

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigation Listed
Developing and Using Models
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed in FOSS Next Generation Investigation Listed
Stability and Change
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Earth and Human Activity

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

Performance Expectation 4.ESS3.1

Students who demonstrate understanding can:
Obtain and combine information to describe that energy and fuels are derived from renewable and non-renewable resources and how their uses affect the environment.

Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels .Assessment Boundary: N/A

Energy Module
Investigation 4, Part 1: notebook entry
Investigation 5, Part 3: notebook entry

Soils, Rocks, and Landforms Module
Investigation 4, Part 1: response sheet

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtain and combine information from books and other reliable media to explain phenomena.

Energy
TE: Investigation 1, Part 4, p. 168
SE: *Engineering a Solar Lighting System,* pp. 25-29

Investigation 4, Part 1, pp. 294-295
SE: *Energy,* pp. 65-73

Investigation 5, Part 3, pp. 377-385
SE: *Alternative Sources of Energy,* pp. 114-119, *Ms. Osgood's Class Report,* pp. 120-121

Soil, Rocks, and Landforms
TE: Investigation 4, Part 1, pp. 276-283
DR: Natural Resources (Video), "Resource ID"

Disciplinary Core Ideas

- 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.

Energy
TE: Investigation 1, Part 4, p. 168
SE: *Engineering a Solar Lighting System,* pp. 25-29

Investigation 4, Part 1, pp. 294-295
SE: *Energy,* pp. 65-73

Investigation 5, Part 3, p. 377-385
SE: *Alternative Sources of Energy,* pp. 114-119, *Ms. Osgood's Class Report,* pp. 120-121

Soil, Rocks, and Landforms
TE: Investigation 4, Part 1, pp. 276-283
DR: Natural Resources (Video), "Resource ID"

Crosscutting Concepts

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

Energy
TE: Investigation 5, Part 3, pp. 377-385

Additional Science and Engineering Practices Addressed

Constructing Explanations
Engaging in Argument from Evidence

Additional Crosscutting Concepts Addressed

Energy and Matter
Scale, Proportion, and Quantity
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 4

Earth and Human Activity

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

Performance Expectation 4ESS3.2

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

Clarification Statement: Examples of solutions could include designing an earthquake resistant building, improving monitoring of volcanic activity, and constructing waterways for flood waters. Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.

Soils, Rocks, and Landforms Module
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: notebook entry
Investigation 3, Part 4: notebook entry; Investigation 3 I-Check

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

Soils, Rocks, and Landforms
TE: Investigation 3, Part 2, p. 239-240
DR: Volcanoes (Video)

Investigation 3, Part 3, pp. 244-249
DR: Mount St. Helens Impact (Video)

Investigation 3, Part 4, pp. 253-259
SE: *It Happened So Fast!,* pp. 38-49
DR: All about Earthquakes (Video)

Disciplinary Core Ideas

- 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.
- Testing a solution involves investigating how well It performs under a range of likely conditions.
- Engineers improve existing technologies or Develop new ones to increase their benefits, to decrease known risks, and to meet societal demands.

Soils, Rocks, and Landforms
TE: Investigation 3, Part 2, p. 239-240
DR: Volcanoes (Video)

Investigation 3, Part 3, pp. 244-249
DR: Mount St. Helens Impact (Video)

Investigation 3, Part 4, pp. 253-259
SE: *It Happened So Fast!,* pp. 38-49
DR: All about Earthquakes (Video)

Crosscutting Concepts

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

Soils, Rocks, and Landforms
TE: Investigation 3, Part 4, pp. 253-259
SE: *It Happened So Fast!,* pp. 38-49
DR: All about Earthquakes (Video)

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Scale Proportion, and Quantity
Stability and Change

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Matter and Its Interactions

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

Performance Expectation 5.PS1.1

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

Clarification Statement: Examples of evidence that could be utilized in building models include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water. Assessment Boundary: Assessment does not include atomic scale mechanism of evaporation and condensation or defining the unseen particles.

Mixtures and Solutions Module
Investigation 1, Part 2: response sheet, notebook entry
Investigation 2, Part 3: response sheet, notebook entry
Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 4, Part 2: response sheet, notebook entry

Earth and Sun Module
Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: notebook entry
Investigation 4, Part 2: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model to describe phenomena.

Mixtures and Solutions
TE: Investigation 1, Part 2, pp. 114-118

Investigation 2, Part 3, pp. 183-188
SE: *Solid to Liquid,* pp. 21-22

Investigation 3, Part 1, pp. 207-211, 212

Investigation 3, Part 2, pp. 215-219

Investigation 4, Part 2, pp. 276-279
SE: *Solutions Up Close,* pp. 26-27; *Concentrated Solutions,* pp. 28-31; *The Air,* pp. 32-35

Earth and Sun
TE: Investigation 3, Part 1, pp. 257-262
DR: Ball on a Scale, Fizz Keeper, Soda Can Experiment

Investigation 3, Part 2, pp. 267-273
DR: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere"

Investigation 4, Part 2, pp. 324-334
SE: *Heating the Air: Radiation and Conduction,* pp. 99-104

Disciplinary Core Ideas

- 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 showing 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; the effects of air on larger particles or objects.

Mixtures and Solutions
TE: Investigation 1, Part 2, pp. 114-122
SE: Mixtures,
DR: "Tutorial: Solutions," "Tutorial: Conservation of Mass"

Investigation 2, Part 3, pp. 183-190
SE: *Solid to Liquid,* pp. 21-22, *Liquid to Gas,* pp. 23-25

Investigation 3, Part 1, pp. 207-212
SE: *Solutions Up Close,* pp. 26-27

Investigation 3, Part 2, pp. 215
SE: *Concentrated Solutions,* pp. 28-31

SE: *Solutions Up Close, Concentrated Solutions, The Air*

Crosscutting Concepts

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

TE: Investigation 1, Part 2, pp. 114-122
SE: Mixtures,
DR: "Tutorial: Solutions," "Tutorial: Conservation of Mass"

Investigation 3, Part 2, pp. 267-273
DR: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere"

Investigation 3, Part 3, pp. 226-227
DR: "Tutorial: Concentration," "Virtual Investigation: Saltwater Concentration"

Investigation 4, Part 1, pp. 264-269

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

DR: "Particles in Solids, Liquids, and Gases," "Energy Transfer: Conduction," Aluminum and Steel Strips in Water (Video)	***Earth and Sun*** **TE:** Investigation 3, Part 1**,** pp. 257-262 **DR:** Ball on a Scale, Fizz Keeper, Soda Can Experiment Investigation 3, Part 2, pp. 267-273 **DR**: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere" Investigation 4, Part 2, pp. 324-334 **SE:** *Heating the Air: Radiation and Conduction,* pp. 99-104 **DR:** "Particles in Solids, Liquids, and Gases," "Energy Transfer: Conduction," Aluminum and Steel Strips in Water (Video)	

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigations Listed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed in FOSS Next Generation Investigations Listed

Energy and Matter
Cause and Effect
Systems and System Models

GRADE 5

Matter and Its Interactions

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

Performance Expectation 5.PS1.2

Students who demonstrate understanding can:

Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that forms new substances. Measurements can be organized in tables, charts, and graphs and can be used as evidence that weight is conserved. Assessment Boundary: Assessment does not include distinguishing between mass and weight.

Mixtures and Solutions Module

Investigation 1, Part 2: response sheet
Investigation 2, Part 3: response sheet
Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment

Science and Engineering Practices

Using Mathematical and Computational Thinking
Represent data in graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.

Mixtures and Solutions
TE: Investigation 1, Part 2, pp. 114-122
DR: "Tutorial: Solutions," "Tutorial: Conservation of Mass"

Investigation 3, Part 1, pp. 207-210
Investigation 3, Part 2, pp. 215-219
Investigation 3, Part 3, pp. 226-227
DR: "Tutorial: Concentration," Virtual Investigation: Saltwater Concentration"

Investigation 4, Part 1, pp. 264-269
Investigation 4, Part 2, pp. 276-279

Investigation 5, Part 3, pp. 340-347
DR: Changes in Properties of Matter (Video)

Disciplinary Core Ideas

- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.
- 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).

Mixtures and Solutions
TE: Investigation 1, Part 2, pp. 114-122

Investigation 3, Part 1, pp. 207-210
Investigation 3, Part 2, pp. 215-222,
SE: *Concentrated Solution,* pp. 28-31

Investigation 3, Part 3, pp. 226-227

Investigation 4, Part 1, pp. pp. 264-269
Investigation 4, Part 2, pp. 276-279

Investigation 5, Part 3, pp. 340-347
DR: Changes in Properties of Matter (Video)

Crosscutting Concepts

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

Mixtures and Solutions
TE: Investigation 1, Part 2, pp. 114-122
DR: "Tutorial: Solutions," "Tutorial: Conservation of Mass"

Investigation 3, Part 1, pp. 207-210
Investigation 3, Part 2, pp. 215-222,
SE: *Concentrated Solution,* pp. 28-31

Investigation 3, Part 3, pp. 226-227

Investigation 5, Part 3, pp. 340-347
DR: Changes in Properties of Matter (Video)

Investigation 4, Part 1, pp. 263-269

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigations Listed

Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed in FOSS Next Generation Investigations Listed

Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Matter and Its Interactions

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

Performance Expectation 5.PS1.3

Students who demonstrate understanding can:

Make observations and measurements to identify materials based on their properties.

Clarification Statement: Observations can be based on direct experiences with materials and comparisons of materials. Examples of materials to be identified could include powders (e.g. baking soda, cornstarch, sugar), metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property. Assessment Boundary: Assessment does not include density or distinguishing mass and weight. 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.

Mixtures and Solutions Module

Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment
Investigation 3, Part 4: notebook entry
Investigation 4, Part 3: performance assessment, notebook entry

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon**.**

Mixtures and Solutions
TE: Investigation 3, Part 1, pp. 207-210
Investigation 3, Part 2, pp. 215-219
Investigation 3, Part 3, pp. 226-227
Investigation 3, Part 4, pp. 236-239

Investigation 4, Part 3, pp. 283-287

Disciplinary Core Ideas

- 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.)

Mixtures and Solutions
TE: Investigation 3, Part 1, pp. 207-212
SE: *Solutions Up Close,* pp. 26-27

Investigation 3, Part 2, pp. 215-219
SE: *Concentrated Solutions,* pp. 28-31

Investigation 3, Part 3, pp. 226-227
SE: *The Air,* pp. 32-35
DR: "Tutorial: Concentration," "Virtual Investigation: Saltwater Concentration"

Investigation 3, Part 4, pp. 236-243
DR: Why Are Oceans Salty? (Video) "Tutorial: Density"

Investigation 4, Part 3, pp. 283-290
SE: *A Sweet Solution,* pp. 47-48; *Sour Power,* p. 49
DR: "Tutorial: Saturation," "Virtual Investigation: Solubility"

Crosscutting Concepts

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

Mixtures and Solutions
TE: Investigation 3, Part 1, pp. 207-212
SE: *Solutions Up Close,* pp. 26-27

Investigation 3, Part 2, pp. 215-219
SE: *Concentrated Solutions,* pp. 28-31

Investigation 3, Part 3, pp. 226-227
SE: *The Air,* pp. 32-35
DR: "Tutorial: Concentration," "Virtual Investigation: Saltwater Concentration"

Investigation 3, Part 4, pp. 236-243
DR: Why Are Oceans Salty? (Video) "Tutorial: Density"

Investigation 4, Part 3, pp. 283-290
SE: *A Sweet Solution,* pp. 47-48; *Sour Power,* p. 49
DR: "Tutorial: Saturation," "Virtual Investigation: Solubility"

Additional Science and Engineering Practices Addressed
Developing and Using Models; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Cause and Effect; Patterns; Systems and System Models; Energy and Matter

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Matter and Its Interactions

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

Performance Expectation 5.PS1.4

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

Clarification Statement: Examples of interactions forming new substances can include mixing baking soda and vinegar. Examples of interactions not forming new substances can include mixing baking soda and water. Assessment Boundary: N/A

Mixtures and Solutions Module
Investigation 5, Part 1: notebook entry
Investigation 5, Part 2: response sheet
Investigation 5, Part 3: notebook entry; Investigation 5 I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
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.

Mixtures and Solutions
TE: Investigation 5, Part 1, pp. 321-326
Investigation 5, Part 2, pp. 329-332
Investigation 5, Part 3, pp. 335-344

Disciplinary Core Ideas

- When two or more different substances are mixed, a new substance with different properties may be formed.

Mixtures and Solutions
TE: Investigation 5, Part 1, pp. 321-326

Investigation 5, Part 2, pp. 329-335
SE: *When Substances Change,* pp.74-78
DR: Chemical Reactions (Video)

Investigation 5, Part 3, pp. 340-347
DR: Changes in the Properties of Matter (Video); "Tutorial: Reaction or Not?"

Crosscutting Concepts

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

Mixtures and Solutions
TE: Investigation 5, Part 2, pp. 329-335
SE: *When Substances Change,* pp.74-78
DR: Chemical Reactions (Video)

Investigation 5, Part 3, pp. 340-347
DR: Changes in the Properties of Matter (Video); "Tutorial: Reaction or Not?"

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Energy and Matter
Systems and System Models
Scale, Proportion, and Quantity

GRADE 5

Topic Motion and Stability: Forces and Interactions

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

Performance Expectation 5.PS2.1

Students who demonstrate understanding can:

Support an argument, with evidence, that Earth's gravitational force pulls objects downward toward the center of the earth.

Clarification Statement: "Downward" is a local description of the direction that points toward the center of the spherical earth. Earth causes objects to have a force on them that point toward the center of the Earth, "downward". Evidence could be drawn from diagrams, models, and data that are provided. Assessment Boundary: Mathematical representation of gravitational force is not assessed.

Earth and Sun Module
Investigation 2, Part 4: response sheet

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct and/or support an argument with evidence, data, and/or a model. ***Earth and Sun*** **TE:** Investigation 2, Part 4, pp. 214-218 **SE:** *Why Doesn't Earth Fly Off into Space?* pp. 62-65	• The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. ***Earth and Sun*** **TE:** Investigation 2, Part 4 **SE:** *Why Doesn't Earth Fly Off into Space?* pp. 62-65 **DR:** The Planets and the Solar System (Video)	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Earth and Sun*** **TE:** Investigation 2, Part 4 **SE:** *Why Doesn't Earth Fly Off into Space?* pp. *62-65*

Additional Science and Engineering Practices Addressed
Developing and Using Models
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Energy

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

Performance Expectation 5.PS3.1

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.

Clarification Statement: Examples of models could include diagrams and flow-charts. Assessment Boundary: Assessment does not include cellular mechanisms of digestive absorption.

Living Systems Module
Investigation 2, Part 2: notebook entry
Investigation 2, Part 3: response sheet, Investigation 2 I-Check

Science and Engineering Practices

Developing and Using Models
Use models to describe phenomena.

Living Systems
TE: Investigation 2, Part 2, pp. 169-176
SE: *Producers,* pp. 23-26

Investigation 2, Part 3, pp. 181-193
SE: *Getting Nutrients,* pp. 27-31
DR: Food Chains (Video)

Disciplinary Core Ideas

- 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).
- Food provides animals with the materials they Need for body repair and growth, energy they Need to maintain body warmth and for motion.

Living Systems
TE: Investigation 2, Part 2, pp. 169-176
SE: *Producers,* pp. 23-26

Investigation 2, Part 3, pp.181-
SE: *Getting Nutrients,* pp. 27-31; *The Biosphere*
DR: Food Chains (Video)

Crosscutting Concepts

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

Living Systems
TE: Investigation 2, Part 2, pp. 169-176
SE: *Producers,* pp. 23-26

Investigation 2, Part 3, pp. 181-
SE: *Getting Nutrients, The Biosphere*
DR: Food Chains (Video)

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Systems and System Models

GRADE 5

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 5.LS1.1

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

Clarification Statement: While energy for plant growth comes from the sun, material for plant growth comes chiefly from air and water, not from the soil. Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil. Assessment Boundary: Does not include molecular explanations of photosynthesis.

Living Systems Module
Investigation 2, Part 2: notebook entry
Investigation 3, Part 1: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Support an argument with evidence, data, or a model. ***Living Systems*** **TE:** Investigation 2, Part 2, pp. 169-176 **SE**: *Producers,* pp. 23-26 Investigation 3, Part 1, pp. 215-231 **SE**: *Plant Vascular Systems,* pp. 36-42 **DR:** Plant Structure and Growth (Video), "Plant Vascular System"	• 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). ***Living Systems*** **TE**: Investigation 2, Part 2, pp. 169-176 **SE**: *Producers,* pp. 23-26 Investigation 3, Part 1, pp. 215-231 **SE**: *Plant Vascular Systems,* pp. 36-42 **DR:** Plant Structure and Growth (Video), "Plant Vascular System"	**Energy and Matter** Matter is transported into, out of, and within systems. ***Living Systems*** **TE:** Investigation 2, Part 2, pp. 169-176 **SE**: *Producers,* pp. 23-26 Investigation 3, Part 1, pp. 215-231 **SE**: *Plant Vascular Systems,* pp. 36-42 **DR:** Plant Structure and Growth (Video), "Plant Vascular System"

Additional Science and Engineering Practices Addressed
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Systems and System Models
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 5.LS2.1

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

Clarification Statement: Emphasis is on the idea that matter in systems cycles among living and nonliving things (air, water, decomposed materials in soil. Examples of systems could include organisms, ecosystems, and the Earth. Assessment Boundary: Assessment does not include photosynthesis or molecular explanations.

Living Systems Module
Investigation 1, Part 2: notebook entry
Investigation 1, Part 3: response sheet, notebook entry
Investigation 4, Part 4: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model to describe phenomena.

Living Systems
TE: Investigation 1, Part 2, pp. 108-116
SE: *The Biosphere,* pp. 7-11

Investigation 1, Part 3, pp. 121-123

Investigation 4, Part 4, pp. 311-315
DR: Marine Ecosystems (Video)

Disciplinary Core Ideas

- 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.
- 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.

Living Systems
TE: Investigation 1, Part 2, pp. 108-116
SE: *The Biosphere,* pp. 7-11

Investigation 1, Part 3, pp. 121-126
SE: *Monterey Bay National Marine Sanctuary,* pp. 12-15, *Comparing Aquatic and Terrestrial Ecosystem,* pp.16-17
DR: Web of Life: Life in the Sea (Video)

Investigation 1, Part 4, pp.130-136
SE: *Nature's Recycling System,* pp. 18-20

Crosscutting Concepts

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

Living Systems
TE: Investigation 1, Part 2, pp. 108-116
SE: *The Biosphere,* pp. 7-11

Investigation 1, Part 3, pp. 121-126
SE: *Monterey Bay National Marine Sanctuary,* pp. 12-15, *Comparing Aquatic and Terrestrial Ecosystem,* pp. 16-17
DR: Web of Life: Life in the Sea (Video)

Investigation 1, Part 4, pp.130-136
SE: *Nature's Recycling System,* pp. 18-20
DR: "Simulation: Food Webs"

Investigation 4, Part 4
SE: *North Atlantic Ocean Ecosystem,* pp. 74-80
DR: Marine Ecosystems (Video)

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	DR: "Simulation: Food Webs" Investigation 4, Part 4 **SE:** *North Atlantic Ocean Ecosystem,* pp. 74-80 **DR:** Marine Ecosystems (Video)	

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Energy and Matter
Stability and Change
Scale, Proportion, and Quantity

GRADE 5

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 5.LS2.2

Students who demonstrate understanding can:
Use models to explain factors that upset the stability to local ecosystems.

Clarification Statement: Explanatory models can include representations of relationships between and among organisms, or simulations can be used to predict how factors might impact an ecosystem. Factors that upset an ecosystem's stability includes invasive species, drought, human development, and removal of predators. Assessment Boundary: Does not include molecular explanations.

Living Systems Module
TE: Investigation 1, Part 2 - Understanding about problems in other ecosystems can help students address local ecosystem issues.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Develop a model to describe phenomena ***Living Systems*** **TE:** Investigation 1, Part 2, pp. 106-116 **SE:** *The Biosphere,* pp. 7-11 **DR**: Physical Systems: Chapter 3 Ecosystems (Video), Web Of Life: Life in the Sea, Marine Ecosystems (Video)	• 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. ***Living Systems*** **TE:** Investigation 1, Part 2, pp. 106-116 **SE:** *The Biosphere,* pp. 7-11 **DR**: Physical Systems: Chapter 3 Ecosystems (Video), Web of Life: Life in the Sea (Video)	**Systems and System Models** A system can be described in terms of its components and their interactions. ***Living Systems*** **TE:** Investigation 1, Part 2, pp. 106-116 **SE:** *The Biosphere* **DR**: Physical Systems: Chapter 3 Ecosystems (Video), Web of Life: Life in the Sea, Marine Ecosystems (Video)

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Energy and Matter
Stability and Change

GRADE 5

Earth's Place in the Universe

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

Performance Expectation 5.ESS1.1

Students who demonstrate understanding can:
Support an argument with evidence that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

Clarification Statement: Examples of scale could include relative distance of specific stars to Earth. Evidence to support arguments could come from data or models. Examples of stars include Polaris, Sirius, and Betelgeuse. Assessment Boundary: Assessment is limited to relative distances, not size of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).

Earth and Sun Module
Investigation 2, Part 5: notebook entry, Investigation 2 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Support an argument with evidence, data, or a model. ***Earth and Sun*** **TE:** Investigation 2, Part 5, pp. 223-231, pp.234-235 **SE:** *Exploring the Solar System,* pp. 48-49 **DR**: All about Stars (Video)	• The sun is a star that appears brighter than other stars because it is closer to Earth. • The sun is a star that appears larger than other stars because it is closer to Earth. • Stars range greatly in their distance from Earth. ***Earth and Sun*** **TE:** Investigation 2, Part 5, pp. 223-231, pp. 234-235 **SE:** *Exploring the Solar System,* pp. 48-49 **DR:** All about Stars (Video), "Star Maps," "Stellar Motions"	**Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large. ***Earth and Sun*** **TE:** Investigation 2, Part 5 **SE:** *Exploring the Solar System,* pp. 48-49 **DR:** All about Stars (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Cause and Effect
Systems and System Models

GRADE 5

Earth's Place in the Universe

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

Performance Expectation 5.ESS1.2

Students who demonstrate understanding can:

Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, in addition to different positions of the sun, moon, and stars at different times of the day, month, and year.

Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun, and selected stars that are visible only in particular months or the position of the moon with respect to the sun and Earth. Assessment Boundary: Assessment does not include causes of seasons or labeling specific phases of the moon.

Earth and Sun Module

Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: response sheet
Investigation 1, Part 3: notebook entry, Investigation 1 I-Check
Investigation 2, Parts 3 and 5: notebook entry

Science and Engineering Practices

Analyzing and Interpreting Data
Represent data in graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.

Earth and Sun
TE: Investigation 1, Part 1, pp. 110-115
Investigation 1, Part 2, pp. 119-128
SE: *Changing Shadows***,** pp. 3-7
DR: "Shadow Tracker"

Investigation 1, Part 3, pp. 132-145
SE: *Sunrise and Sunset,* pp. 8-13
DR: "US Naval Observatory: Duration of Daylight/Darkness for One Year," "Seasons"

Investigation 2, Part 1, pp. 175-182, 185
Investigation 2, Part 3, pp. 199-205
SE: *Changing Moon,* pp. 33-37, *Lunar Cycle,* pp. 38-42, *Eclipses*, pp. 43-46
DR: All about the Moon (Video), "Lunar Calendar"

Investigation 2, Part 5, pp. 223-231
SE: *Stargazing,* pp. 66-70
DR: All about Stars (Video)

Disciplinary Core Ideas

- 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.

Earth and Sun
TE: Investigation 1, Part 1, pp. 110-115
Investigation 1, Part 2, pp. 119-128
SE: *Changing Shadows***,** pp. 3-7
DR: "Shadow Tracker"

Investigation 1, Part 3, pp. 132-145
SE: *Sunrise and Sunset,* pp. 8-13
DR: "US Naval Observatory: Duration of Daylight/Darkness for One Year," "Seasons"

Investigation 2, Part 1, pp. 175-182, 185
Investigation 2, Part 3, pp. 199-205
SE: *Changing Moon,* pp. 33-37, *Lunar Cycle,* pp. 38-42, *Eclipses*, pp. 43-46
DR: All about the Moon (Video), "Lunar Calendar"

Investigation 2, Part 5, pp. 223-231
SE: *Stargazing,* pp. 66-70, *Our Galaxy,* pp. 77-80
DR: All about Stars (Video)

Crosscutting Concepts

Patterns
Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena.

Earth and Sun
TE: Investigation 1, Part 1, pp. 110-115
Investigation 1, Part 2, pp. 119-128
SE: *Changing Shadows***,** pp. 3-7
DR: "Shadow Tracker"

Investigation 1, Part 3, pp. 132-145
SE: *Sunrise and Sunset,* pp. 8-13
DR: "US Naval Observatory: Duration of Daylight/Darkness for One Year," "Seasons"

Investigation 2, Part 1, pp. 175-182, 185
Investigation 2, Part 5, pp. 223-231
SE: *Stargazing,* pp. 66-70, *Our Galaxy,* pp. 77-80
DR: All about Stars (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Models; Planning and Carrying Out Investigation; Asking Questions and Defining Problems; Engaging in Argument from Evidence; Constructing Explanations and Designing Solutions; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 5

Earth's Systems

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

Performance Expectation 5.ESS2.1

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

Clarification Statement: The geosphere, hydrosphere, atmosphere, and biosphere are each a system. Examples of system interactions could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. Assessment Boundary: Assessment is limited to the interactions of two systems at a time.

Living Systems Module
Investigation 1, Part 2: notebook entry

Earth and Sun Module
Investigation 3, Parts 1-2: notebook entry
Investigation 4, Part 1: notebook entry
Investigation 4, Part 3: response sheet, notebook entry
Investigation 5, Part 3: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model using an example to describe phenomena.

Living Systems
TE: Investigation 1, Part 2, pp. 106-108
SE: *Is Earth a System?* pp. 5-6
DR: Physical Systems (Video)

Earth and Sun
TE: Investigation 3, Part 1, pp. 257-264
SE: *What Is Air?* pp. 81-84
DR: Ball on a Scale (Video), Fizz Keeper (Video), Soda Can Experiment (Video)

Investigation 3, Part 2, pp. 267-273
SE: *Earth's Atmosphere* pp. 85-91,
DR: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere"

Investigation 4, Part 1, pp. 312-320
SE: *Uneven Heating,* pp, 95-98
DR: "Tutorial: Radiation," "Virtual Investigation: Uneven Heating"

Investigation 4, Part 3, pp. 337-347
SE: *Wind and Convection:* pp. 105-109; *Wind Power,* pp. 110-111
DR: Convection (Video), "Energy Transfer: Convection"

Disciplinary Core Ideas

- Earth's major systems are the geosphere, hydrosphere, atmosphere, and biosphere.
- 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 landforms to determine patterns of weather.

Living Systems
TE: Investigation 1, Part 2, pp. 106-108
SE: *Is Earth a System?* pp. 5-6
DR: Physical Systems (Video)

Earth and Sun
TE: Investigation 3, Part 1, pp. 257-264
SE: *What Is Air?* pp. 81-84
DR: Ball on a Scale (Video), Fizz Keeper (Video), Soda Can Experiment (Video)

Investigation 3, Part 2, pp. 276-273
SE: *Earth's Atmosphere* pp. 85-91,
DR: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere"

Investigation 4, Part 1, pp. 312-320
SE: *Uneven Heating,* pp, 95-98
DR: "Tutorial: Radiation," "Virtual Investigation: Uneven Heating"

Crosscutting Concepts

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

Living Systems
TE: Investigation 1, Part 2, pp. 106-108
SE: *Is Earth a System?* pp. 5-6
DR: Physical Systems (Video)

Earth and Sun
TE: Investigation 3, Part 1, pp. 257-264
SE: *What Is Air?* pp. 81-84
DR: Ball on a Scale (Video), Fizz Keeper (Video), Soda Can Experiment (Video)

Investigation 3, Part, 2, pp. 276-273
SE: *Earth's Atmosphere* pp. 85-91,
DR: Earth's Atmosphere (Video), "Tutorial: Air and Atmosphere"

Investigation 4, Part 3, pp. 337-347
SE: *Wind and Convection:* pp. 105-109; *Wind Power,* pp. 110-111
DR: Convection (Video), "Energy Transfer: Convection"

Investigation 5, Part 3, pp. 399-407, 411
SE: *The Water Cycle,* pp. 125-129
DR: Water Cycle (Video)

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Investigation 5, Part 3, pp. 399-407, 411 **SE:** *The Water Cycle,* pp. 125-129 **DR**: Water Cycle (Video)	Investigation 4, Part 3, pp. 337-347 **SE:** *Wind and Convection:* pp. 105-109; *Wind Power,* pp. 110-111 **DR:** Convection (Video), "Energy Transfer: Convection" Investigation 5, Part 3, pp. 399-407, 411 **SE:** *The Water Cycle,* pp. 125-129 **DR**: Water Cycle (Video)	

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns; *Earth and Sun*; Energy and Matter; Stability and Change; Cause and Effect; Scale, Proportion, and Quantity; Structure and Function

GRADE 5

Earth's Systems

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

Performance Expectation 5.ESS2.2

Students who demonstrate understanding can:

Describe and graph amounts of saltwater and freshwater in various reservoirs to provide evidence about the distribution of water on Earth.

Clarification Statement: Descriptions could include comparisons using graphs, charts, and tables. Quantities could include percentages, total volume, and amounts. Emphasis is on using amounts or percentages of water to make comparisons. No attempt to calculate percentages should be made. Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, groundwater, and polar ice caps, and does not include the atmosphere. Only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. Assessment should not include circle charts(pie charts) or calculation of percentages.

Earth and Sun
Investigation 5, Part 3: notebook entry

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematical and Computational Thinking Describe and graph quantities such as area and volume to address scientific questions. ***Earth and Sun*** **TE:** Investigation 5, Part 3, pp. 399-406, p. 408 **DR:** "Water-Cycle Game"	• Nearly all of Earth's available water is in the ocean. • Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands and the atmosphere. ***Earth and Sun*** **TE:** Investigation 5, Part 3, pp. 399-408 **SE:** *Where is Earth's Water?* p. 124 **DR:** Water Cycle (Video), "Water-Cycle Game"	**Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight and volume. ***Earth and Sun*** **TE:** Investigation 5, Part 3, pp. 399-406 **SE:** *Where is Earth's Water?* p. 124

Additional Science and Engineering Practices Addressed

Developing and Using Models; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Systems and System Models

GRADE 5

Earth and Human Activity

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

Performance Expectation 5.ESS3.1

Students who demonstrate understanding can:

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environments.

Clarification Statement: Examples of information might include the use of natural fertilizers or biological pest control by farmers, replanting trees after cutting them by the logging industry, and the institution of recycling programs in cities .Assessment Boundary: Assessment is limited to one human interaction at a time.

Earth and Sun Module
Investigation 5, Part 4: notebook entry

Living Systems Module
Investigation 4, Part 3: notebook entry

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

Earth and Sun
TE: Investigation 5, Part 4, pp. 420-421
SE: *Global Climate Change,* pp. 144-151
DR: Climate and Seasons (Video)

Living Systems
TE: Investigation 4, Part 3, pp. 306-307
SE: *Monarch Migration,* pp. 70-73
DR: Bugs (Video), Incredible Journeys: A Butterfly's Relay (Video)

Disciplinary Core Ideas

- 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.

Earth and Sun
TE: Investigation 5, Part 4, pp. 420-421
SE: *Global Climate Change,* pp. 144-151
DR: Climate and Seasons (Video)

Living Systems
TE: Investigation 4, Part 3, pp. 306-307
SE: *Monarch Migration,* pp. 70-73
DR: Bugs (Video), Incredible Journeys: A Butterfly's Relay (Video)

Crosscutting Concepts

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

Earth and Sun
TE: Investigation 5, Part 4, pp. 420-421
SE: *Global Climate Change,* pp. 144-151
DR: Climate and Seasons (Video)

Living Systems
TE: Investigation 4, Part 3, pp. 306-307
SE: *Monarch Migration,* pp. 70-73
DR: Bugs (Video), Incredible Journeys: A Butterfly's Relay (Video)

Additional Science and Engineering Practices Addressed
Constructing Explanations and Designing Solutions

GRADE 6

Matter and Its Interactions

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

Performance Expectation 6.PS1.4

Students who demonstrate understanding can:

Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium. Assessment Boundary: The use of mathematical formulas is not intended.

Weather and Water Course

Investigation 3, Part 2: performance assessment
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check
Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: notebook entry
Investigation 6, Part 3: notebook entry; Investigation 6, I-Check
Investigation 7, Part 2: response sheet
Investigation 7, Part 3: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model to predict and/or describe phenomena.

Weather and Water

TE: Investigation 3, Part 2, pp. 268-283
SE: *Density,* pp. 41-46; *Density with Dey,* pp. 47-50
DR: "Particles in Solids, Liquids, and Gases," Fluid Convection (Video)

Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection," Convection Chamber in Action (Video)

Investigation 6, Part 1, pp. 436-448
SE: *Heating the Atmosphere,* pp. 69-75

Investigation 6, Part 2, pp. 451-456
DR: "Local Wind"

Investigation 6, Part 3, pp.462-481
SE: *Wind on Earth,* pp. 76-84
DR: NOAA Ridge (Video)

Investigation 7, Part 2, pp. 509-515

Investigation 7, Part 3, pp. 520-529
DR: Cloud in a Bottle (Video)

Disciplinary Core Ideas

- Objects in contact exert forces on each other. Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.
- The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects.
- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material.
- Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material.

Crosscutting Concepts

Cause and Effect:
Cause and effect relationships are routinely identified, tested, and used to explain change.

Weather and Water

TE: Investigation 3, Part 2, pp. 268-283
SE: *Density,* pp. 41-46; *Density with Dey,* pp. 47-50
DR: "Particles in Solids, Liquids, and Gases," Fluid Convection (Video)

Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection," Convection Chamber in Action (Video)

Investigation 6, Part 1, pp. 436-448
SE: *Heating the Atmosphere,* pp. 69-75

Investigation 6, Part 2, pp. 451-456
DR: "Local Wind"

Investigation 6, Part 3, pp.462-481
SE: *Wind on Earth,* pp. 76-84
DR: NOAA Ridge (Video)

Investigation 7, Part 2, pp. 509-515

Investigation 7, Part 3, pp. 520-529
DR: Cloud in a Bottle (Video)

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	Weather and Water **TE:** Investigation 3, Part 2, pp. 268-283 **SE:** *Density,* pp. 41-46; *Density with Dey,* pp. *47-50* **DR:** "Particles in Solids, Liquids, and Gases," Fluid Convection (Video) Investigation 3, Part 3, pp. 288-295 **SE**: *Convection,* pp. 51-52 **DR**: "Energy Transfer: Conduction, Radiation, Convection," Convection Chamber in Action (Video) Investigation 6, Part 1, pp. 436-448 **SE**: *Heating the Atmosphere,* pp. 69-75 Investigation 6, Part 2, pp. 451-456 **DR:** "Local Wind" Investigation 6, Part 3, pp.462-481 **SE:** *Wind on Earth,* pp. 76-84 **DR:** NOAA Ridge (Video) Investigation 7, Part 2, pp. 509-515 Investigation 7, Part 3, pp. 520-529 **DR:** Cloud in a Bottle (Video)	

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Scale, Proportion, and Quantity
Patterns
Systems and System Models
Energy and Matter
Stability and Change
Structure and Function

GRADE 6

Energy

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

Performance Expectation 6.PS3.3

Students who demonstrate understanding can:

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*

Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup. Care should be taken with devices that concentrate significant amounts of energy, e.g. conduction, convection, and/or radiation. Assessment Boundary: Assessment does not include calculating the total amount of thermal energy.

Weather and Water Course

Investigation 5, Part 2: response sheet
Investigation 5, Part 3: performance assessment

Science and Engineering Practices

Designing Solutions
Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system.

Weather and Water
TE: Investigation 5, Part 2, pp. 392-399
DR: "Particles in Solids, Liquids, and Gases" (Online Activity)

Investigation 5, Part 3, pp. 403-419
SE: *Home Insulation,* pp. 64-68

Disciplinary Core Ideas

- Temperature is a measure of the average kinetic energy of particles of matter.
- The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present.
- Energy is spontaneously transferred out of hotter regions or objects and into colder ones.
- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful.
- Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions.
- A solution needs to be tested, and then modified on the basis of the test results in order to improve it.
- There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem.

Weather and Water
TE: Investigation 5, Part 1, pp. 378-387
DR: Conduction through Metals (Video), "Energy Transfer by Collision," "Energy Transfer: Conduction, Radiation, Convection," "Particles in Solids, Liquids, and Gases," "Thermometer"

Investigation 5, Part 2, pp. 392-399
DR: "Particles in Solids, Liquids, and Gases" (Online Activity)

Investigation 5, Part 3, pp. 403-419
SE: *Home Insulation,* pp. 64-68

Crosscutting Concepts

Energy and Matter
The transfer of energy can be tracked as energy flows through a designed or natural system.

Weather and Water
TE: Investigation 5, Part 1, pp. 378-387
DR: Conduction through Metals (Video), "Energy Transfer by Collision," "Energy Transfer: Conduction, Radiation, Convection," "Particles in Solids, Liquids, and Gases," "Thermometer"

Investigation 5, Part 2, pp. 392-399
DR: "Particles in Solids, Liquids, and Gases"

Investigation 5, Part 3, pp. 403-419
SE: *Home Insulation,* pp. 64-68

Additional Science and Engineering Practices Addressed
Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking**;** Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Energy and Matter; Systems and System Models; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Energy

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

Performance Expectation 6.PS3.4

Students who demonstrate understanding can:
Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added. Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.

Weather and Water Course

Investigation 3, Part 2: performance assessment
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check
Investigation 4, Part 3: performance assessment
Investigation 5, Part 1: notebook entry
Investigation 5, Part 2: response sheet
Investigation 5, Part 3: performance assessment

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.

Weather and Water

TE: Investigation 4, Part 3, pp. 346-358
SE: *Thermometer: A Device to Measure Temperature,* pp. 59-63
DR: Energy Transfer: Conduction, Radiation, Convection"

Investigation 5, Part 1, pp. 378-387
DR: "Energy Transfer by Collision," "Energy Transfer: Conduction, Radiation, Convection," "Particles in Solids, Liquids, and Gases," "Thermometer," Conduction Through Metals (Video)

Investigation 5, Part 2, pp. 392-399
DR: "Particles in Solids, Liquids, and Gases"

Investigation 5, Part 3, pp. 403-419
SE: *Home Insulation,* pp. 64-68

Disciplinary Core Ideas

•Temperature is a measure of the average kinetic energy of particles of matter.
•The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present.
•The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment.

Weather and Water

TE: investigation 3, Part 2, pp. 268-283
SE: *Density,* pp. 41-46; *Density with Dey,* pp. 47-50
DR: "Particles in Solids, Liquids, and Gases," Fluid Convection (Video)

Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection," Convection Chamber in Action (Video)

Investigation 4, Part 3, pp. 346-358
SE: *Thermometer: A Device to Measure Temperature,* pp. 59-63
DR: "Energy Transfer: Conduction, Radiation, Convection"

Investigation 5, Part 1, pp. 378-387
DR: "Energy Transfer by Collision," "Energy Transfer: Conduction, Radiation, Convection," "Particles in Solids, Liquids, and Gases," "Thermometer," Conduction Through Metals (Video)

Crosscutting Concepts

Scale, Proportion, and Quantity
Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.

Weather and Water

TE: Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection," Convection Chamber in Action (Video)

Investigation 4, Part 3, pp. 346-358
SE: *Thermometer: A Device to Measure Temperature,* pp. 59-63
DR: Energy Transfer: Conduction, Radiation, Convection"

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	Investigation 5, Part 2, pp. 392-399 **DR**: "Particles in Solids, Liquids, and Gases" Investigation 5, Part 3, pp. 403-419 **SE**: *Home Insulation,* pp. 64-68	

Additional Science and Engineering Practices Addressed
Developing and Using Models
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Cause and Effect
Energy and Matter
Systems and System Models
Structure and Function
Stability and Change

GRADE 6

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 6.LS1.1

Students who demonstrate understanding can:
Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells. Assessment Boundary: Assessment does not include identification of specific cell types and should emphasize the use of evidence from investigations.

Diversity of Life Course

Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment
Investigation 3, Part 4: notebook entry; Investigation 3 I-Check
Investigation 4, Part 1: notebook entry, response sheet
Investigation 4, Part 2: quick write
Investigation 4, Part 3: notebook entry
Investigation 4, Part 4: notebook entry; Investigation 4 I-Check
Investigation 5, Part 3: notebook entry
Investigation 9, Part 2: notebook entry

Human Systems Interactions Course*

TE: Investigation 1, Part 1: notebook entry

Science and Engineering Practices

Planning and Carrying Out Investigations
Conduct an investigation to produce data to serve as the basis for evidence that meets the goals of an investigation.

Diversity of Life
TE: Investigation 3, Part 1, pp.228-235
DR: Lab Techniques: Making a Wet- Mount (Video), "Virtual Microscope," "Database: Elodea Cells," "Database: Elodea Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: The Amazing Paramecium, pp. 14-19
DR: Lab Techniques: Preparing a Paramecia Wet-Mount Slide (Video), "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 3, pp. 254-258
SE: Microorganism Guide, pp. 106-109
DR: "Database: Microorganism Collection"

Disciplinary Core Ideas

•All living things are made up of cells, which is the smallest unit that can be said to be alive.
•An organism may consist of one single cell unicellular) or many different numbers and types of cells (multicellular).

Diversity of Life
TE: Investigation 3, Part 1, pp.228-235
DR: Lab Techniques: Making a Wet- Mount (Video), "Virtual Microscope," "Database: Elodea Cells," "Database: Elodea Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: The Amazing Paramecium, pp. 14-19
DR: Lab Techniques: Preparing a Paramecia Wet-Mount Slide (Video), "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 3, pp. 254-258
SE: Microorganism Guide, pp. 106-109
DR: "Database: Microorganism Collection"

Crosscutting Concepts

Scale, Proportion, and Quantity
Phenomena that can be observed at one scale may not be observable at another scale.

Diversity of Life
TE: Investigation 3, Part 1, pp.228-235
DR: Lab Techniques: Making a Wet- Mount (Video), "Virtual Microscope," "Database: Elodea Cells," "Database: Elodea Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: The Amazing Paramecium, pp. 14-19
DR: Lab Techniques: Preparing a Paramecia Wet-Mount Slide (Video), "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 3, pp. 254-258
SE: Microorganism Guide, pp. 106-109
DR: "Database: Microorganism Collection"

Investigation 3, Part 4, pp. 263-279
SE: *Cells*, pp. 20-27; *How Big are Cells?* pp. 110-113

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Investigation 3, Part 4, pp. 263-279
SE: *Cells,* pp. 20-27; *How Big are Cells?* pp. 110-113
DR: Lab Techniques: Making a Human-Cheek-Tissue Slide (Video), "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 1, pp. 306-318
SE: *Levels of Complexity Research Pages,* pp. 114-120
DR: Lab Techniques: Inoculating an Agar Plate (Video); "The Scale of the Universe," "Levels of Complexity Card Sort"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43

Investigation 4, Part 3, pp. 352-361
DR: "Levels of Complexity: Fungal Cell," "Funk Fungi Freak Show," "Fungus"

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Investigation 3, Part 4, pp. 263-279
SE: *Cells,* pp. 20-27; *How Big are Cells?* pp. 110-113
DR: Lab Techniques: Making a Human-Cheek-Tissue Slide (Video), "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 1, pp. 306-318
SE: *Levels of Complexity Research Pages,* pp. 114-120
DR: Lab Techniques: Inoculating an Agar Plate (Video); "The Scale of the Universe," "Levels of Complexity Card Sort"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43

Investigation 4, Part 3, pp. 352-361
DR: "Levels of Complexity: Fungal Cell," "Funk Fungi Freak Show," "Fungus"

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Investigation 5, Part 3, pp. 417-432
SE: *Water, Light, and Energy,* pp. 50-57
DR: "Plant Vascular System"

Investigation 9, Part 2, pp. 628-639
SE: *Viruses: Living or Nonliving?* pp. 95-100
DR: Flu Attack! (Video), Viruses on the Attack (Video)

Human Systems Interactions
TE: Investigation 1, Part 1, pp. 87-94
DR: Doctor Interview 1 (Video); "Levels of Complexity"

DR: Lab Techniques: Making a Human-Cheek-Tissue Slide (Video), "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 1, pp. 306-318
SE: *Levels of Complexity Research Pages,* pp. 114-120
DR: Lab Techniques: Inoculating an Agar Plate (Video); "The Scale of the Universe," "Levels of Complexity Card Sort"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Human Systems Interactions
TE: Investigation 1, Part 1, pp. 87-94
DR: Doctor Interview 1 (Video); "Levels of Complexity"

*This course incorporates this performance expectation, but is not the course's main focus.

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Cause and Effect
Systems and System Models
Structure and Function

GRADE 6

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 6.LS1.2

Students who demonstrate understanding can:
Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall. Other organelles can be introduced while covering this concept. Assessment Boundary: Assessment of organelle structure/function relationships limited to cell wall and cell membrane. Assessment of other organelles is limited to their relationship to the whole cell. Assessment does not include biochemical functions of cell or cell parts.

Diversity of Life Course

Investigation 3, Part 1: performance assessment
Investigation 3, Part 2: response sheet
Investigation 3, Part 4: notebook entry; Investigation 3 I-Check
Investigation 4, Part 2: quick write
Investigation 4, Part 3: notebook entry
Investigation 4, Part 4: notebook entry; Investigation 4 I-Check

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe phenomena.

Diversity of Life
TE: Investigation 3, Part 1, pp. 228-235
DR: "Database: Elodea Cells," Database: Elodea," Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: *The Amazing Paramecium,* pp. 14-19
DR: "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 4, pp. 263-279
SE: *The Cell,* pp. 20-27
DR: "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43

Investigation 4, Part 3, pp. 352-361
DR: "Levels of Complexity: Fungal Cell," "Funk Fungi Freak Show," "Fungus"

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Disciplinary Core Ideas

Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell.

Diversity of Life
TE: Investigation 3, Part 1, pp. 228-235
DR: "Database: Elodea Cells," Database: Elodea," Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: *The Amazing Paramecium,* pp. 14-19
DR: "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 4, pp. 263-279
SE: *The Cell,* pp. 20-27
DR: "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43
Investigation 4, Part 3, pp. 352-361
DR: "Levels of Complexity: Fungal Cell," "Funk Fungi Freak Show," "Fungus"

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Crosscutting Concepts

Structure and Function
Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts.

Diversity of Life
TE: Investigation 3, Part 1, pp. 228-235
DR: "Database: Elodea Cells," Database: Elodea," Cytoplasmic Streaming," "Levels of Complexity: Plant Cell"

Investigation 3, Part 2, pp. 240-250
SE: *The Amazing Paramecium,* pp. 14-19
DR: "Levels of Complexity: Protist Cell," "Database: Paramecium Collection"

Investigation 3, Part 4, pp. 263-279
SE: *The Cell,* pp. 20-27
DR: "Database: Human Cheek Cells," "Levels of Complexity: Animal Cell"

Investigation 4, Part 2, pp. 326-347
SE: *Bacteria Around Us,* pp. 28-35, *Harmful and Helpful Bacteria,* pp. 36-43

Investigation 4, Part 3, pp. 352-361
DR: "Levels of Complexity: Fungal Cell," "Funk Fungi Freak Show," "Fungus"

Investigation 4, Part 4, pp. 365-373
DR: "Levels of Complexity: Archaean Cell," "Classification History"

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Systems and System Models; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 6.LS1.3

Students who demonstrate understanding can:
Use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.
Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.

Human Systems Interactions Course
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment

Science and Engineering Practices

Engaging in Argument from Evidence
Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon.

Human Systems Interactions
TE: Investigation 1, Part 1, pp. 87-94
DR: Doctor Interview 1 (Video), "Levels of Complexity," "Structural Levels Cards"

Investigation 1, Part 2, pp. 99-112
SE: *Human Organ Systems,* pp. 3-49; *Disease Information,* pp. 98-103 *Diabetes Affects Human Organ Systems,* p. 97
DR: Doctor Interview 2 (Video); "Structural Level Cards," "Climate Change Indicators in the United States"

Disciplinary Core Ideas

- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

Human Systems Interactions
TE: Investigation 1, Part 1, pp. 87-94
DR: Doctor Interview 1 (Video), "Levels of Complexity," "Structural Levels Cards"

Investigation 1, Part 2, pp. 99-112
SE: *Human Organ Systems,* pp. 3-49; *Disease Information,* pp. 98-103 *Diabetes Affects Human Organ Systems,* p. 97
DR: Doctor Interview 2 (Video); "Structural Level Cards," "Climate Change Indicators in the United States"

Crosscutting Concepts

Systems and System Models
Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems.

Human Systems Interactions
TE: Investigation 1, Part 1, pp. 87-94
DR: Doctor Interview 1 (Video), "Levels of Complexity," "Structural Levels Cards"

Investigation 1, Part 2, pp. 99-112
SE: *Human Organ Systems,* pp. 3-49; *Disease Information,* pp. 98-103 *Diabetes Affects Human Organ Systems,* p. 97
DR: Doctor Interview 2 (Video); "Structural Level Cards," "Climate Change Indicators in the United States"

Additional Science and Engineering Practices Addressed

Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Cause and Effect
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 6.LS1.8

Students who demonstrate understanding can:

Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Clarification Statement: Examples include: receptors in the eye that respond to light intensity and color; receptors in hair cells of the inner ear that detect vibrations conducted from the eardrum; taste buds that detect chemical qualities of foods including sweetness, bitterness, sourness, saltiness, and umami (savory taste); and receptors in the skin that respond to variations in pressure. Assessment Boundary: The assessment should provide evidence of students' abilities to provide a basic and conceptual explanation of the process. Assessment does not include mechanisms for the transmission of this information.

Human Systems Interactions Course

Investigation 3, Parts 1 and 3: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 4: notebook entry; Investigation 3 I-Check

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Read and comprehend grade appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas.

Human Systems Interactions
TE: Investigation 3, Part 1, pp. 173-189
SE: *Sensory Receptors,* pp. 55-59; *Touch,* pp. 60-63 *Hearing,* pp. 64-68
DR: "Touch Menu: Touch Receptors," "Touch Menu: 3D Finger"

Investigation 3, Part 2, pp. 193-212
SE: *Brain Messages,* pp. 79-83 ; *Neurotransmission,* pp. 84-87
DR: "Brain: Synapse Function," "Brain: Neuron Growth"

Investigation 3, Part 3, pp. 216-229
SE: *Sensory Receptors,* pp. 55-59; *Smell and Taste,* pp. 69-73 ; *Sight,* pp. 74-78
DR: "Smell Menu," "Vision Menu," "Reaction Timer"

Investigation 3, Part 4, pp. 235-249
SE: *Memory and Your Brain,* pp. 88-92
DR: How Memory Works (Video)

Disciplinary Core Ideas

•Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories.

Human Systems Interactions
TE: Investigation 3, Part 1, pp. 173-189
SE: *Sensory Receptors,* pp. 55-59, *Touch,* pp. 60-63 *Hearing,* pp. 64-68
DR: "Touch Menu: Touch Receptors," "Touch Menu: 3D Finger"

Investigation 3, Part 2, pp. 193-212
SE: *Brain Messages,* pp. 79-83 ; *Neurotransmission,* pp. 84-87
DR: "Brain: Synapse Function," "Brain: Neuron Growth"

Investigation 3, Part 3, pp. 216-229
SE: *Sensory Receptors,* pp. 69-73; *Smell And Taste,* pp. 69-73; *Sight,* pp. 74-78
DR: "Smell Menu," "Vision Menu," "Reaction Timer"

Investigation 3, Part 4, pp. 235-249
SE: *Memory and Your Brain,* pp. 88-92
DR: How Memory Works (Video)

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural systems

Human Systems Interactions
TE: Investigation 3, Part 2, pp. 193-212
SE: *Brain Messages,* pp. 79-83 ; *Neurotransmission,* pp. 84-87
DR: "Brain: Synapse Function," "Brain: Neuron Growth"

Additional Science and Engineering Practices Addressed in FOSS Next Generation Investigations Listed
Developing and Using Models; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking

Additional Crosscutting Concepts Addressed in FOSS Next Generation Investigations Listed
Patterns; Systems and System Models; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Place in the Universe

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

Performance Expectation 6.ESS1.4

Students who demonstrate understanding can:

Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's geologic history.

Clarification Statement: Emphasis is on analyses of rock formations and fossils they contain to establish relative ages of major events in Earth's history. Scientific explanations can include models to study the geologic time scale. Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.

Earth History Course

Investigation 3, Part 3: notebook entry
Investigation 4, Part 1: response sheet
Investigation 4, Part 2: notebook entry
Investigation 4, Part 3: performance assessment, notebook entry, Investigation 4 I-Check

Science and Engineering Practices

Constructing Explanations
Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past, and will continue to do so in the future.

Earth History Course
TE: Investigation 3 Part 3, pp. 294-302
SE: *Water on Mars?* pp. 40-44
DR: "Rock Column Movie Maker," "Sedimentary Rocks Tour," "Rock Data Base"

Investigation 4, Part 1, pp. 328-345
SE: *Grand Canyon Fossils,* pp. 173-174, *Fossil Identification,* pp. 167-172, *Modern Sedimentary Environments,* pp. 164-165, *A Fossil Primer,* pp. 45-49, *Features of Sedimentary Rocks,* p. 166
DR: "Limestone Formation," "Sandstone Formation," "Shale Formation," "Rock Column Movie Maker"

Investigation 4, Part 2, pp. 351-359
SE: *The Geologic Time Scale,* p. 175, *Fossil Identification,* pp. 167-172
DR: "Timeliner"

Investigation 4, Part 3, pp. 364-392
SE: *Rocks, Fossils, and Time,* pp. 50-63, *Grand Canyon Views,* pp. 138-141, *The Great Unconformity,* pp. 178, *Floating on a Prehistoric Sea,* pp. 64-67
DR: "Dating Rock Layers," "Index-Fossil Correlation"

Disciplinary Core Ideas

•The geologic time scale interpreted from rock strata provides a way to organize Earth's history.
•Major historical events include the formation of mountain chains and ocean basins, the adaptation and extinction of particular living organisms, volcanic eruptions, periods of massive glaciation, and development of watersheds and rivers through glaciation and water erosion.
•Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.

Earth History Course
TE: Investigation 3 Part 3, pp. 294-302
SE: *Water on Mars?* pp. 40-44
DR: "Rock Column Movie Maker," "Sedimentary Rocks Tour," "Rock Data Base"

Investigation 4, Part 1, pp. 328-345
SE: *Grand Canyon Fossils,* pp. 173-174, *Fossil Identification,* pp. 167-172, *Modern Sedimentary Environments,* pp. 164-165, *A Fossil Primer,* pp. 45-49 *Features of Sedimentary Rocks,* p. 166
DR: "Limestone Formation," "Sandstone Formation," "Shale Formation," "Rock Column Movie Maker"

Investigation 4, Part 2, pp. 351-359
SE: *The Geologic Time Scale,* p. 175, *Fossil Identification,* pp. 167-172
DR: "Timeliner"

Investigation 4, Part 3, pp. 364-392
SE: *Rocks, Fossils, and Time,* pp. 50-63, *Grand Canyon Views,* pp. 138-141, *The Great Unconformity,* pp. 178, *Floating on a Prehistoric Sea,* pp. 64-67
DR: "Dating Rock Layers," "Index-Fossil Correlation"

Crosscutting Concepts

Scale, Proportion, and Quantity
Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

Earth History Course
TE: Investigation 3 Part 3, pp. 294-302
SE: *Water on Mars?* pp. 40-44
DR: "Rock Column Movie Maker," "Sedimentary Rocks Tour," "Rock Data Base"

Investigation 4, Part 2, pp. 351-359
SE: *The Geologic Time Scale,* p. 175, *Fossil Identification,* pp. 167-172
DR: "Timeliner"

Investigation 4, Part 3, pp. 364-392
SE: *Rocks, Fossils, and Time,* pp. 50-63, *Grand Canyon Views,* pp. 138-141, *The Great Unconformity,* pp. 178 *Floating on a Prehistoric Sea,* pp. 64-67
DR: "Dating Rock Layers," "Index-Fossil Correlation"

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed Patterns; Stability and Change; Cause and Effect; Systems and System Models; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Place in the Universe

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

Performance Expectation 6.ESS2.1

Students who demonstrate understanding can:
Develop a model to describe the cycling of Earth's materials and the flow of energy that drives these processes within and among Earth's systems.

Clarification Statement: Emphasis is on how energy from the sun and Earth's hot interior drive processes that cause physical and chemical changes to materials within and between the geosphere, hydrosphere, atmosphere, and biosphere. Examples of processes could include melting, crystallization, weathering, deformation, and sedimentation, which act together to form and change rocks and minerals through the rock cycle.
Assessment Boundary: Assessment does not include the identification or naming of minerals.

Earth History Course
Investigation 7, Part 1: notebook entry
Investigation 7, Part 2, notebook entry, performance assessment, Investigation 7 I-Check

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe phenomena.

Earth History
TE: Investigation 7, Part 1, 546-567
SE: *Earth's Dynamic Systems,* pp. 81-87
DR: "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types

Investigation 7, Part 2, pp. 573-595
SE: *Rock Transformations,* pp. 88-92
How One Rock Becomes Another Rock, pp. 93-98
DR: "Appalachian Mountain Tour," "How Metamorphic Rocks Form"

Investigation 9, Part 2 pp. 660-662

Disciplinary Core Ideas

•All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produces chemical and physical changes in Earth's materials.

Earth History
TE: Investigation 6, Part 1, pp. 415-421
DR: "Pacific Northwest Tour," "Earth's Interior"

Investigation 7, Part 1, 546-567
SE: *Earth's Dynamic Systems,* pp. 81-87
DR: "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types

Investigation 7, Part 2, pp. 573-595
SE: *Rock Transformations,* pp. 88-92
How One Rock Becomes Another Rock, pp. 93-98
DR: "Appalachian Mountain Tour," "How Metamorphic Rocks Form"

Crosscutting Concepts

Stability and Change
Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale.

Earth History
TE: Investigation 7, Part 1, 546-567
SE: *Earth's Dynamic Systems,* pp. 81-87
DR: "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types

Investigation 7, Part 2, pp. 573-595
SE: *Rock Transformations,* pp. 88-92
How One Rock Becomes Another Rock, pp. 93-98
DR: "Appalachian Mountain Tour," "How Metamorphic Rocks Form"

Additional Science and Engineering Practices Addressed
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Energy and Matter
Stability and Change
Cause and Effect
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Systems

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

Performance Expectation 6.ESS2.2

Students who demonstrate understanding can:

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges)or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes usually behave gradually but are repunctuated by catastrophic events (such as earthquakes, volcanoes, and meteor impacts). Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate. Assessment Boundary: Assessment does not include identification or naming of specific events.

Earth History Course

- Investigation 1, Part 1: notebook entry
- Investigation 2, Part 1: notebook entry
- Investigation 2, Part 2: response sheet
- Investigation 2, Part 3: response sheet; Investigation 2 I-Check
- Investigation 3, Part 2: notebook entry
- Investigation 3, Part 3: notebook entry
- Investigation 5, Part 1: performance assessment
- Investigation 5, Part 3: notebook entry
- Investigation 6, Part 1: performance assessment
- Investigation 6, Part 2: notebook entry
- Investigation 6, Part 3: notebook entry; Investigation 6 I-Check
- Investigation 7, Part 1: notebook entry
- Investigation 7, Part 2: performance assessment

Science and Engineering Practices

Constructing Explanations
Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

Earth History
TE: Investigation 1, Part , pp. 117-130
SE: *Seeing Earth***,** pp. 3-6 , *Landforms Gallery,* pp. 132-135, *Landforms Vocabulary,* p. 136
DR: Google Earth™; "Landforms Tour"

Investigation 2, Part 1, pp. 190-
SE: *Grand Canyon Flood,* pp. 12-19, *Wentworth Scale of Rock Particle Sizes,* p. 159, *Colorado Plateau Map,* p. 153

DR: Stream Table: High Flow vs. Low Flow (Video), Stream Table: High Slope vs. Low Slope (Video), Stream Table Heterogeneous vs. Homogeneous Material (Video), Glen Canyon Dam High Flow Experiment, USGS (Video)

Investigation 2, Part 2, pp. 208-226
SE: *Weathering and Erosion,* pp. 20-26, *Erosion on the Colorado Plateau, pp. 155-158, Wentworth Scale of Rock Particle Sizes,* p. 159, *Sand Analysis,* pp. 160-161 *Sand on the Move,* p. 162

Disciplinary Core Ideas

•The planet's systems interact over scales that range from microscopic to global in size; these interactions have shaped Earth's history and will determine its future.
•Water's movements, both on the land and underground, cause weathering and erosion, which change the land's surface features and create underground formations.

Earth History
TE: Investigation 2, Part 1, pp. 190- 201
SE: *Grand Canyon Flood,* pp. 12-19, *Wentworth Scale of Rock Particle Sizes,* p. 159, *Colorado Plateau Map,* p. 153
DR: Stream Table: High Flow vs. Low Flow (Video), Stream Table: High Slope vs. Low Slope (Video), Stream Table Heterogeneous vs. Homogeneous Material (Video), Glen Canyon Dam High Flow Experiment, USGS (Video)

Investigation 2, Part 2, pp. 208-226
SE: *Weathering and Erosion,* pp. 20-26, *Erosion on the Colorado Plateau, pp. 155-158, Wentworth Scale of Rock Particle Sizes,* p. 159, *Sand Analysis,* pp. 160-161, *Sand on the Move,* p.162
DR: Freezing Glass Bottle (Video), Debris Flow (Video), Rock Fall (Video), Frost Wedging (Video)

Crosscutting Concepts

Scale, Proportion, and Quantity
Standard units are used to measure and describe physical quantities such as weight and volume.

Earth History
TE: Investigation 2, Part 1, pp. 190- 201
SE: *Grand Canyon Flood,* pp. 12-19, *Wentworth Scale of Rock Particle Sizes,* p. 159, *Colorado Plateau Map,* p. 153
DR: Stream Table: High Flow vs. Low Flow (Video), Stream Table: High Slope vs. Low Slope (Video), Stream Table Heterogeneous vs. Homogeneous Material (Video), Glen Canyon Dam High Flow Experiment, USGS (Video)

Investigation 2, Part 2, pp. 208-226
SE: *Weathering and Erosion,* pp. 20-26, *Erosion on the Colorado Plateau, pp. 155-158, Wentworth Scale of Rock Particle Sizes,* p. 159, *Sand Analysis,* pp. 160-161, *Sand on the Move,* p. 162
DR: Freezing Glass Bottle (Video), Debris Flow (Video), Rock Fall (Video), Frost Wedging (Video)

Investigation 2, Part 3, pp. 232-240
SE: *Soil Stories,* pp. 27-33, *Wentworth Scale of Rock Particle Sizes,* p. 159

Investigation 3, Part 3, pp. 294-302
DR: "Rock Column Movie Maker,"

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

DR: Freezing Glass Bottle (Video), Debris Flow (Video), Rock Fall (Video), Frost Wedging (Video) Investigation 2, Part 3, pp. 232-240 **SE:** *Soil Stories,* pp. 27-33, *Wentworth Scale of Rock Particle Sizes,* p. 159 Investigation 3, Part 2, pp. 282-289 **SE:** *Where in the World is Calcium Carbonate?* Pp. 34-39 Investigation 3, Part 3, pp. 294-302 **DR:** "Rock Column Movie Maker," "Sedimentary Rocks Tour," "Rock Database," Google Earth™ Investigation 5, Part 1, pp. 415-421 **DR:** "Earth's Interior," "Pacific Northwest Tour" Investigation 5, Part 3, pp. 447-453 **SE**: *Map of the Pacific Northwest: Igneous Rock Locations,* p. 185; *Typical Earth Rocks,* pp. 179-181 **DR:** "Rock Database" Investigation 6, Part 1, pp. 478-487 **SE:** *Volcanoes,* pp. 186-189 **DR:** Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World" Investigation 6, Part 2, pp. 490-495 **DR:** "Volcanoes around the World," "Earthquakes around the World," "Wegener," Questions and Answers (Video) Investigation 6, Part 3, pp. 500-519 **SE:** *The History of the Theory of Plate Tectonics,* pp. 74-79 *Historical Debates about a Dynamic Earth,* p. 80 **DR:** Convection Tank (Video), NOAA Plate Tectonics (Video) Investigation 7, Part 1, pp. 546-567 **SE:** *Earth's Dynamic Systems,* pp. 81-87 **DR:** "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types Investigation 7, Part 2, pp. 573-579 **SE:** *Rock Transformations*, pp. 88-92; *How One Rock Becomes Another Rock,* pp. 93 98 **DR:** "Appalachian Mountain Tour," Google Earth™	Investigation 2, Part 3, pp. 232-240 **SE:** *Soil Stories,* pp. 27-33, *Wentworth Scale of Rock Particle Sizes,* p. 159 Investigation 3, Part 2, pp. 282-289 **SE:** *Where in the World is Calcium Carbonate?* Pp. 34-39 Investigation 3, Part 3, pp. 294-302 **DR:** "Rock Column Movie Maker," "Sedimentary Rocks Tour," "Rock Database," Google Earth™ Investigation 5, Part 1, pp. 415-421 **DR:** "Earth's Interior," "Pacific Northwest Tour" Investigation 5, Part 3, pp. 447-453 **SE**: *Map of the Pacific Northwest: Igneous Rock Locations,* p. 185; *Typical Earth Rocks,* pp. 179-181 **DR:** "Rock Database" Investigation 6, Part 1, pp. 478-487 **SE:** *Volcanoes,* pp. 186-189 **DR:** Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World" Investigation 6, Part 2, pp. 490-495 **DR:** "Volcanoes around the World," "Earthquakes around the World," "Wegener," Questions and Answers (Video) Investigation 6, Part 3, pp. 500-519 **SE:** *The History of the Theory of Plate Tectonics,* pp. 74-79 *Historical Debates about a Dynamic Earth,* p. 80 **DR:** Convection Tank (Video), NOAA Plate Tectonics (Video) Investigation 7, Part 1, pp. 546-567 **SE:** *Earth's Dynamic Systems,* pp. 81-87 **DR:** "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types Investigation 7, Part 2, pp. 573-579 **SE:** *Rock Transformations*, pp. 88-92; *How One Rock Becomes Another Rock,* p. 93-98 **DR:** "Appalachian Mountain Tour," Google Earth™	"Sedimentary Rocks Tour," "Rock Database," Google Earth™ Investigation 6, Part 1, pp. 478-487 **SE:** *Volcanoes,* pp. 186-189 **DR:** Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World"

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed Patterns; Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Systems

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

Performance Expectation 6.ESS2.3

Students who demonstrate understanding can:

Analyze and interpret data on the patterns of distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

Clarification Statement: Examples could include identifying patterns on maps of earthquakes and volcanoes relative to plate boundaries, the shapes of the continents, the locations of ocean structures (including mountains, volcanoes, faults, and trenches), or similarities of rock and fossil types on different continents. Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.

Earth History Course

Investigation 6, Part 1: performance assessment
Investigation 6, Part 2: notebook entry
Investigation 6, Part 3: notebook entry; Investigation 6 I-Check
Investigation 7, Part 1: notebook entry

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to determine similarities and differences in findings.

Earth History
TE: Investigation 6, Part 1, pp. 478-487
SE: *Volcanoes,* pp. 186-189
DR: Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World"

Investigation 6, Part 2, pp. 490-495
DR: "Volcanoes around the World," "Earthquakes around the World," "Wegener," Questions and Answers (Video)

Disciplinary Core Ideas

•Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.
•Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.

Earth History
TE: Investigation 6, Part 1, pp. 478-487
SE: *Volcanoes,* pp. 186-189
DR: Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World"

Investigation 6, Part 2, pp. 490-495
DR: "Volcanoes around the World," "Earthquakes around the World," "Wegener," Questions and Answers (Video)

Investigation 6, Part 3, pp. 500-519
SE: *The History of the Theory of Plate Tectonics,* pp. 74-79
Historical Debates about a Dynamic Earth, p. 80
DR: Convection Tank (Video), NOAA Plate Tectonics (Video)

Investigation 7, Part 1, 546-567
SE: *Earth's Dynamic Systems,* pp. 81-87
DR: "Convergent Boundary," "Divergent Boundary," "Transform Boundary," "Folding," "Volcanoes around the World," Mountain Types

Crosscutting Concepts

Patterns
Patterns in rate of change and other numerical relationships can provide information about natural and human-designed systems.

Earth History
TE: Investigation 6, Part 1, pp. 478-487
SE: *Volcanoes,* pp. 186-189
DR: Mount St. Helens: The Eruption (Video), ShakeAlert (Video), "Volcanoes," "Volcanoes around the World," "Earthquakes around the World"

Investigation 6, Part 2, pp. 490-495
DR: "Volcanoes around the World," "Earthquakes around the World," "Wegener," Questions and Answers (Video)

Additional Science and Engineering Practices Addressed Developing and Using Models; Asking Questions and Defining Problem; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Systems

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

Performance Expectation 6.ESS2.4

Students who demonstrate understanding can:
Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical. Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.

Weather and Water Course

Investigation 7, Part 1: performance assessments
Investigation 7, Part 2: response sheet
Investigation 7, Part 3: notebook entry; Investigation 7 I-Check
Investigation 8, Part 1: notebook entry
Investigation 8, Part 2: notebook entry
Investigation 8, Part 3: performance assessment; Investigation 8 I-Check

Science and Engineering Practices

Developing and Using Models
Develop a model to describe unobservable mechanisms.

Weather and Water

TE: Investigation 7, Part 1, pp. 501-506
Investigation 7, Part 2, pp, 509-515
Investigation 7, Part 3, pp. 520-530
SE: *Observing Clouds,* pp. 124-125, *Raindrops and Cloud Droplets,* p.123

Investigation 8, Part 1, pp. 551-566
SE: *Earth: The Water Planet,* pp. 91-95

Investigation 8, Part 2, pp. 568-580
SE: *Ocean Currents and Gyres,* pp. 96-102
DR: Perpetual Ocean (Video)

Disciplinary Core Ideas

•Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, and crystallization, and precipitation, as well as downhill flows on land.
•Global movements of water and its changes in form are propelled by sunlight and gravity.

Weather and Water

TE: Investigation 7, Part 1, pp. 501-506
Investigation 7, Part 2, pp, 509-515
Investigation 7, Part 3, pp. 520-530
SE: *Observing Clouds,* pp. 124-125, *Raindrops and Cloud Droplets,* p.123

Investigation 8, Part 1, pp. 551-566
SE: *Earth: The Water Planet,* pp. 91-95

Investigation 8, Part 2, pp. 568-580
SE: *Ocean Currents and Gyres,* pp. 96-102
DR: Perpetual Ocean (Video)

Investigation 8, Part 3, pp. 584-595
SE: *El Nino,* pp. 103-104

Crosscutting Concepts

Energy and Matter
Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter.

Weather and Water

TE: Investigation 7, Part 2, pp, 509-515
Investigation 7, Part 3, pp. 520-530
SE: *Observing Clouds,* pp. 124-125, *Raindrops and Cloud Droplets,* p.123

Investigation 8, Part 1, pp. 551-566
SE: *Earth: The Water Planet,* pp. 91-95

Investigation 8, Part 2, pp. 568-580
SE: *Ocean Currents and Gyres,* pp. 96-102
DR: Perpetual Ocean (Video)

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth's Systems

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

Performance Expectation 6.ESS2.5

Students who demonstrate understanding can:
Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses interact. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation). Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.

Weather and Water Course

Investigation 2, Part 1: response sheet
Investigation 2, Part 2: performance assessment; Investigation 2 I-Check
Investigation 3, Part 2, performance assessment
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check
Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: notebook entry
Investigation 6, Part 3: notebook entry, Investigations 5-6 I-Check
Investigation 10, Part 1: performance assessment

Science and Engineering Practices

Planning and Carrying Out Investigations
Collect data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.

Weather and Water
TE: Investigation 1, Part 2, pp. 146-150

Investigation 2, Part 1, pp. 202-206

Investigation 3, Part 2, pp. 268-275

Investigation 6, Part 3, pp. 462-467

Disciplinary Core Ideas

•Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things.
•These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
•Because these patterns are so complex, weather can be predicted only probabilistically.

Weather and Water
TE: Investigation 1, Part 1, pp. 136-141

Investigation 1, Part 2, pp. 146-157
DR: "Gas in a Syringe" (Online Activity)

Investigation 2, Part 1, pp. 202-219
SE: *What is Air Pressure?* Pp. 32-40
DR: Barometer in a Bottle (Video), "Gas in a Syringe," "Weather-Balloon Simulation," "Barometer in a Bottle"

Investigation 2, Part 2, pp. 222-229

Investigation 3, Part 2, pp. 268-283
SE: *Density,* pp. 41-45
DR: Fluid Convection (Video), "Particles in Solids, Liquids, and Gases"

Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection" (Online Activity)

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Weather and Water
TE: Investigation 1, Part 2, pp. 146-157
DR: "Gas in a Syringe" (Online Activity)

Investigation 2, Part 1, pp. 202-219
SE: *What is Air Pressure?* Pp. 32-40
DR: Barometer in a Bottle (Video), "Gas in a Syringe," "Weather-Balloon Simulation," "Barometer in a Bottle"

Investigation 2, Part 2, pp. 222-229

Investigation 3, Part 2, pp. 268-283
SE: *Density,* pp. 41-45
DR: Fluid Convection (Video), "Particles in Solids, Liquids, and Gases"

Investigation 3, Part 3, pp. 288-295
SE: *Convection,* pp. 51-52
DR: "Energy Transfer: Conduction, Radiation, Convection"

Investigation 6, Part 1, pp. 436-448
SE: *Heating the Atmosphere,* pp. 69-75

Investigation 6, Part 2, pp.
DR: "Local Wind: (Online Activity)

Investigation 6, Part 3, pp.
SE: *Radar Images of Cloud Cover*, p. 122;

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	Investigation 6, Part 1, pp. 436-448 **SE:** *Heating the Atmosphere,* pp. 69-75 Investigation 6, Part 2, pp. **DR:** "Local Wind: (Online Activity) Investigation 6, Part 3, pp. **SE:** *Radar Images of Cloud Cover*, p. 122; *Wind on Earth,* pp. 76-84 **DR:** NOAA Ridge (Video), Red Spot Movie (Video) Investigation 10, Part 1: pp. 673-680 **DR:** "Weather Maps" (Online Activity)	*Wind on Earth,* pp. 76-84 **DR:** NOAA Ridge (Video), Red Spot Movie (Video) Investigation 10, Part 1: pp. 673-680 **DR:** "Weather Maps" (Online Activity)

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Energy and Matter
Systems and System Models
Scale, Proportion, and Quantity

GRADE 6

Earth's Systems

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

Performance Expectation 6.ESS2.6

Students who demonstrate understanding can:

Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.

Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation (e.g., Gulf Stream, North Pacific Drift, California Current)is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Interactions between the atmosphere and oceans can affect the ocean's surface temperature(El Nino/La Nina).Examples of models can be diagrams, maps and globes, or digital representations. Assessment Boundary: Assessment should not be focused on specific weather events, but on the patterns that drive Earth's climate systems.

Weather and Water Course

Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: notebook entry
Investigation 6, Part 3: notebook entry; Investigation 6 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Develop and use a model to describe phenomena. ***Weather and Water*** **TE:** Investigation 6, Part 1, pp. 436-448 **SE:** *Heating the Atmosphere,* pp. 69-75 Investigation 6, Part 2, pp. 451-456 **DR:** "Local Wind" Investigation 6, Part 3, pp. 462-481 **SE:** *Wind on Earth,* pp. 76-84 **DR:** Red Spot Movie (Video) Investigation 8, Part 2, pp. 568-580 **SE**: *Ocean Currents and Gyres,* pp. 96-102 **DR**: Perpetual Ocean (Video) Investigation 8, Part 3, pp. 584-595 **SE:** *El Nino,* pp. 103-104	•Variations in density due to variations in temperature and salinity drive a global pattern on interconnected ocean currents. •Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. •These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. •The ocean exerts a major influence on weather and climate by absorbing energy from the sun, and globally redistributing it through ocean currents. ***Weather and Water*** **TE:** Investigation 6, Part 1, pp. 436-448 **SE:** *Heating the Atmosphere,* pp. 69-75 Investigation 6, Part 2, pp. 451-456 **DR:** "Local Wind" Investigation 6, Part 3, pp. 462-481 **SE:** *Wind on Earth,* pp. 76-84 **DR:** Red Spot Movie (Video) Investigation 8, Part 2, pp. 568-580 **SE**: *Ocean Currents and Gyres,* pp. 96-102 **DR**: Perpetual Ocean (Video) Investigation 8, Part 3, pp. 584-595 **SE:** *El Nino,* pp. 103-104	**Systems and System Models** Models can be used to represent systems and their interactions(such as inputs, processes, and outputs) and energy, matter, and information flows within the systems. ***Weather and Water*** **TE:** Investigation 6, Part 3, pp. 462-481 **SE:** *Wind on Earth,* pp. 76-84 **DR:** Red Spot Movie (Video) Investigation 8, Part 3, pp. 584-595 **SE:** *El Nino,* pp. 103-104

Additional Science and Engineering Practices Addressed Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed Patterns; Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 6

Earth and Human Activity

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

Performance Expectation 6.ESS3.2

Students who demonstrate understanding can:

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes(such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires), or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts). Assessment Boundary: N/A
Paste clarification statements and assessment boundaries here]

Earth History Course

Investigation 6, Part 1: notebook entry

Weather and Water Course

Investigation 9, Part 1: performance assessment
Investigation 9, Part 2: notebook entry
Investigation 9, Part 3: performance assessment; Investigation 9 I-Check

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to provide evidence for phenomena.

Earth History
TE: Investigation 6, Part 1, pp. 486-487, p. 520
DR: ShakeAlert (Video)

Weather and Water
TE: Investigation 9, Part 1, pp. 616-622
DR: "Earth's Climate Over Time"

Investigation 9, Part 2: pp. 626-
SE: *Climates, Past, Present and Future,* pp. 105-110
DR: Carbon Cycle (Video), "Greenhouse-Gas Simulator," "Human-Caused Sources of Carbon Dioxide"

Disciplinary Core Ideas

•Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces, can help forecast the locations and likelihoods of future events.

Earth History
TE: Investigation 6, Part 1, pp. 486-487, p. 520
DR: ShakeAlert (Video)

Weather and Water
TE: Investigation 1, Part 1, pp. 132-136
SE: *Severe Weather,* pp. 3-17
DR: Hurricanes and Tornadoes (Video)

Investigation 9, Part 1, pp. 616-622
DR: "Earth's Climate Over Time"

Investigation 9, Part 2, pp. 626-
SE: *Climates, Past, Present and Future,* pp. 105-110
DR: Carbon Cycle (Video), "Greenhouse-Gas Simulator," "Human-Caused Sources of Carbon Dioxide"

Investigation 9, Part 3: pp. 648-657
DR: Climate Change Basics (Video) "Water Cycle": choose "Global Warming" setting

Crosscutting Concepts

Patterns
Graphs, charts, and images can be used to identify patterns in data.

Earth History
TE: Investigation 6, Part 1, pp. 486-487, p. 520
DR: ShakeAlert (Video)

Weather and Water
TE: Investigation 9, Part 1, pp. 616-622
DR: "Earth's Climate Over Time"

Investigation 9, Part 2:
SE: *Climates, Past, Present and Future,* pp. 105-110
DR: Carbon Cycle (Video), "Greenhouse-Gas Simulator," "Human-Caused Sources of Carbon Dioxide"

Investigation 9, Part 3: pp. 648-657
DR: Climate Change Basics (Video) "Water Cycle": choose "Global Warming" setting

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Matter and Its Interactions

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

Performance Expectation 7.PS1.1

Students who demonstrate understanding can:

Develop models to describe the atomic composition of simple molecules and extended structures.

Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms. Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete depiction of all individual atoms in a complex molecule or extended structure
Paste clarification statements and assessment boundaries here]

Chemical Interactions Course

Investigation 2, Part 1: performance assessment
Investigation 2, Part 2: response sheet; Investigation 2 I-Check
Investigation 9, Part 1: notebook entry

Science and Engineering Practices

Developing and Using Models
Use a model to predict the relationships between systems or between components of a system.

Chemical Interactions

TE: Investigation 2, Part 1, pp.
SE: *Elements,* pp. 3-12
DR: "Periodic Table of Elements"

Investigation 2, Part 2, pp. 189-199
SE: *Substances on Earth,* pp. 13-14; *Elements in the Universe,* pp. *15-23*
DR: "Periodic Table of Elements"

Investigation 9, Part 1, pp. 558-575
SE: *Better Living Through Chemistry,* pp. 110-117; *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181; *Organic Compounds,* pp. 141-147

Disciplinary Core Ideas

•Substances are made from different types of atoms, which combine with one another in various ways.
•Atoms form molecules that range in size from two to thousands of atoms.
•Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).

Chemical Interactions

TE: Investigation 2, Part 1, pp.
SE: *Elements,* pp. 3-12
DR: "Periodic Table of Elements"

Investigation 2, Part 2, pp. 189-199
SE: *Substances on Earth,* pp. 13-14; *Elements in the Universe,* pp. *15-23*
DR: "Periodic Table of Elements"

Investigation 9, Part 1, pp. 558-575
SE: *Better Living Through Chemistry,* pp. 110-117; *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181; *Organic Compounds,* pp. 141-147

Crosscutting Concepts

Scale, Proportion, and Quantity
Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

Chemical Interactions

TE: Investigation 2, Part 2, pp. 189-199
SE: *Substances on Earth,* pp. 13-14; *Elements in the Universe,* pp. *15-23*
DR: "Periodic Table of Elements"

Investigation 9, Part 1, pp. 558-575
SE: *Better Living Through Chemistry,* pp. 110-117; *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181; *Organic Compounds,* pp. 141-147

Additional Science and Engineering Practices Addressed

Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Cause and Effect
Systems and System Models
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Matter and Its Interactions

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Performance Expectation 7.PS1.2

Students who demonstrate understanding can:
Analyze and interpret patterns of data related to the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Clarification Statement: Analyze characteristic chemical and physical properties of pure substances. Examples of chemical reactions could include burning sugar or steel wool, baking a cake, milk curdling, or metal rusting. Assessment Boundary: Assessment is limited to analysis of the following properties: color change, formation of a gas, temperature change, density, melting point, boiling point, solubility, flammability, and odor.

Chemical Interactions Course
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 9, Part 1: notebook entry
Investigation 9, Part 2: performance assessment
Investigation 9, Part 3: response sheet
Investigation 10, Part 1: notebook entry

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to determine similarities and differences in findings.

Chemical Interactions
TE: Investigation 1, Part 1, pp. 123-128

Investigation 1, Part 2, pp. 135-147
SE: *White Substances Information,* pp. 165-173
DR: "Two-Substance Reactions"

Investigation 9, Part 2, pp. 583-605
SE: *How Do Atoms Rearrange?* Pp. 118-129; *Fireworks,* pp. 130-133
DR: Burning Sugar Demonstration (Video)

Investigation 9, Part 3, pp. 611-623

Investigation 10, Part 1, pp. 642-649

Disciplinary Core Ideas

•Each pure substance has characteristic physical and chemical properties(for any bulk quantity under given conditions) that can be used to identify it.
•Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.

Chemical Interactions
TE: Investigation 1, Part 1, pp. 123-128

Investigation 1, Part 2, pp. 135-147
SE: *White Substances Information,* pp. 165-173
DR: "Two-Substance Reactions"

Investigation 9, Part 1, pp. 558-565
SE: *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181

Investigation 9, Part 2, pp. 583-605
SE: *How Do Atoms Rearrange?* Pp. 118-129; *Fireworks,* pp. 130-133
DR: Burning Sugar Demonstration (Video)

Investigation 9, Part 3, pp. 611-623

Investigation 10, Part 1, pp. 642-649

Crosscutting Concepts

Patterns
Macroscopic patterns are related to the nature of microscopic and atomic-level structure.

Chemical Interactions
TE: Investigation 1, Part 2, pp. 135-147
SE: *White Substances Information,* pp. 165-173
DR: "Two-Substance Reactions"

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Matter and Its Interactions

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

Performance Expectation 7.PS1.3

Students who demonstrate understanding can:
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.*

Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels. Assessment Boundary: N/A

Chemical Interactions Course
Investigation 9, Part 1: notebook entry

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Gather, read, synthesize information from multiple appropriate sources, and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

Chemical Interactions
TE: Investigation 9, Part 1, pp. 565-573
SE: *Better Living Through Chemistry,* pp. 110-117

Disciplinary Core Ideas

•Each pure substance has characteristics, physical and chemical properties (for any bulk quantity under given conditions),that can be used to identify it.
•Substances react chemically in characteristic ways.
•In a chemical process, the atoms that make up The original substances regroup into different molecules, and these new substances have different properties from those of the reactants.
•Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.
•The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

Chemical Interactions
TE: Investigation 9, Part 1, pp. 565-573
SE: *Better Living Through Chemistry,* pp. 110-117

Crosscutting Concepts

Structure and Function
Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Chemical Interactions
TE: Investigation 9, Part 1, pp. 565-573
SE: *Better Living Through Chemistry,* pp. 110-117

Additional Science and Engineering Practices Addressed
Developing and Using Models

Additional Crosscutting Concepts Addressed
Cause and Effect
Systems and System Models

GRADE 7

Matter and Its Interactions

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

Performance Expectation 7.PS1.5

Students who demonstrate understanding can:

Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms. Assessment Boundary: Assessment does not include the use of atomic masses or intermolecular forces.

Chemical Interactions Course

Investigation 9, Part 1: notebook entry
Investigation 9, Part 2: performance assessment
Investigation 9, Part 3: response sheet
Investigation 10, Part 1: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model to describe unobservable mechanics.

Chemical Interactions

TE: Investigation 9, Part 1, pp. 558-565
SE: *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181

Investigation 9, Part 2, pp. 583-605
SE: *How Do Atoms Rearrange?* Pp. 118-129; *Fireworks,* pp. 130-133
DR: Burning Sugar Demonstration (Video)

Investigation 9, Part 3, pp. 611-623
SE: *Antoine-Laurent Lavoisier: The Father of Modern Chemistry,* pp. 134-140; *Organic Compounds*, pp. 141-147

Investigation 10, Part 1, pp. 642-649

Disciplinary Core Ideas

•Substances react chemically in characteristic ways.
•In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
•The total number of each type of atom is conserved and thus, the mass does not change. Laws are regularities or mathematical descriptions of natural phenomena.

Chemical Interactions

TE: Investigation 9, Part 1, pp. 558-565
SE: *Atoms and Compounds,* p. 180; *Compound Structure,* p. 181

Investigation 9, Part 2, pp. 583-605
SE: *How Do Atoms Rearrange?* Pp. 118-129; *Fireworks,* pp. 130-133
DR: Burning Sugar Demonstration (Video)

Investigation 9, Part 3, pp. 611-623
SE: *Antoine-Laurent Lavoisier: The Father of Modern Chemistry,* pp. 134-140; *Organic Compounds*, pp. 141-147

Investigation 10, Part 1, pp. 642-649

Crosscutting Concepts

Energy and Matter
Matter is conserved because atoms are conserved in physical and chemical processes.

Chemical Interactions

TE: Investigation 9, Part 2, pp. 583-605
SE: *How Do Atoms Rearrange?* Pp. 118-129; *Fireworks,* pp. 130-133
DR: Burning Sugar Demonstration (Video)

Investigation 9, Part 3, pp. 611-623
SE: *Antoine-Laurent Lavoisier: The Father of Modern Chemistry,* pp. 134-140; *Organic Compounds*, pp. 141-147

Investigation 10, Part 1, pp. 642-649

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Matter and Its Interactions

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

Performance Expectation 7.PS1.6

Students who demonstrate understanding can:
Construct, test, and modify a device that releases or absorbs thermal energy by chemical processes to solve a problem.*

Clarification Statement: Examples of device modification could include changing factors such as type and concentration of a substance. Examples of problems could be keeping a chemical ice pack cold longer or chemical heat pack warm longer. Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride. Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substances in testing the device.
Paste clarification statements and assessment boundaries here]

Chemical Interactions Course
Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: performance assessment

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Undertake a design project engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints

Chemical Interactions
TE: Investigation 6, Part 1
DR: "Energy Flow"
"Particles in Solids, Liquids, and Gases"

Investigation 6, Part 2
SE: *Engineering a Better Design,* pp. 56-63; *Science Practices,* p. 182; *Engineering Practices,* p. 183

Disciplinary Core Ideas

•Some chemical reactions release energy, others store energy.
•A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
•The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

Chemical Interactions
TE: Investigation 6, Part 1
DR: "Energy Flow"
"Particles in Solids, Liquids, and Gases"

Investigation 6, Part 2
SE: *Engineering a Better Design,* pp. 56-63; *Science Practices,* p. 182; *Engineering Practices,* p. 183

Crosscutting Concepts

Energy and Matter
The transfer of energy can be tracked as energy flows through a designed or natural system.

Chemical Interactions
TE: Investigation 6, Part 1
DR: "Energy Flow"
"Particles in Solids, Liquids, and Gases"

Investigation 6, Part 2
SE: *Engineering a Better Design,* pp. 56-63; *Science Practices,* p. 182; *Engineering Practices,* p. 183

Additional Science and Engineering Practices Addressed
Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Cause and Effect
Systems and System Models
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Energy

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

Performance Expectation 7.PS3.5

Students who demonstrate understanding can:

Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Clarification Statement :Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object. Assessment Boundary: Assessment does not include calculations of energy.

Chemical Interactions Course

Investigation 4, Part 1: performance assessment
Investigation 4, Part 2: response sheet
Investigation 4, Part 3: notebook entry; Investigation 4 I-Check
Investigation 5, Part 1: notebook entry
Investigation 5, Part 2: response sheet
Investigation 5, Part 3: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon**.**	•When the motion energy of an object changes, there is inevitably some other change in energy at the same time. ***Chemical Interactions*** **TE:** Investigation 4, Part 1, pp. 274-280 Investigation 4, Part 2, pp. 286-303 **SE**: *Particles in Motion,* pp. 33-39 *Three Phases of Matter,* pp. 28-32 Investigation 4, Part 3, pp. 307- **SE:** *Expansion and Contraction,* pp. 40-45 **DR:** "Particles in Solids, Liquids, and Gases" Investigation 5, Part 1, pp. 333-339 Investigation 5, Part 2, pp. 342-359 **SE**: *Energy on the Move,* pp. 46-55 **DR:** "Energy Transfer by Collision," "Mixing Hot and Cold Water," "Thermometer," "Energy Flow" Investigation 5, Part 3, pp. 363-372 **DR**: "Mixing Hot and Cold Water" "Energy Flow"	**Energy and Matter** The transfer of energy can be tracked as energy flows through a designed or natural system. ***Chemical Interactions*** **TE:** Investigation 4, Part 1, pp. 274-280 Investigation 4, Part 2, pp. 286-303 **SE**: *Particles in Motion,* pp. 33-39 *Three Phases of Matter,* pp. 28-32 Investigation 4, Part 3, pp. 307- **SE:** *Expansion and Contraction,* pp. 40-45 **DR:** "Particles in Solids, Liquids, and Gases" Investigation 5, Part 1, pp. 333-339 Investigation 5, Part 2, pp. 342-359 **SE**: *Energy on the Move,* pp. 46-55 **DR:** "Energy Transfer by Collision," "Mixing Hot and Cold Water," "Thermometer," "Energy Flow" Investigation 5, Part 3, pp. 363-372 **DR**: "Mixing Hot and Cold Water" "Energy Flow"

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

From Molecules to Organisms: Structure and Function

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

Performance Expectation 7.LS1.6

Students who demonstrate understanding can:
Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Clarification Statement: Emphasis is on tracing movement of matter and flow of energy .Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.

Populations and Ecosystems Course
Investigation 5, Part 2: response sheet
Investigation 5, Part 4: notebook entry; Investigation 5, I-Check
Investigation 6, Part 1: notebook entry

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

Populations and Ecosystems
TE: Investigation 5, Part 1, pp. 359-367
Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Investigation 6, Part 1, pp. 424-429

Disciplinary Core Ideas

•Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.
•The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur.
•In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen.

Populations and Ecosystems
TE: Investigation 5, Part 1, pp. 359-367
Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Investigation 6, Part 1, pp. 424-429

Crosscutting Concepts

Energy and Matter
Within a natural system, the transfer of energy drives the motion and/or cycling of matter.

Populations and Ecosystems
TE: Investigation 5, Part 1, pp. 359-367
Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Investigation 6, Part 1, pp. 424-429

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

From Molecules to Organisms: Structure and Function

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

Performance Expectation 7.LS1.7

Students who demonstrate understanding can:
Develop a model to describe how food molecules in plants and animals are broken down and rearranged through chemical reactions to form new molecules that support growth and/or release energy as matter moves through an organism.

Clarification Statement: Emphasis is on describing how energy stored within food molecules is released as they are broken apart and rearranged into new molecules. Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.

Populations and Ecosystems Course
Investigation 5, Part 2: response sheet
Investigation 5, Part 4: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop a model to predict and/or describe phenomena.

Populations and Ecosystems
TE: Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Disciplinary Core Ideas

•Within an individual organism, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or release energy.
•Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials.

Populations and Ecosystems
TE: Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Crosscutting Concepts

Energy and Matter
Matter is conserved because atoms are conserved in physical and chemical processes.

Populations and Ecosystems
TE: Investigation 5, Part 2, pp.371-382
SE: *Energy and Life,* pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Additional Science and Engineering Practices Addressed
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Scale, Proportion, and Quantity
Systems and System Models
Structure and Function

GRADE 7

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 7.LS2.1

Students who demonstrate understanding can:

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources. Assessment Boundary: Determining the carrying capacity of ecosystems is beyond the intent

Populations and Ecosystems Course

Investigation 7, Part 1: notebook entry
Investigation 7, Part 2: performance assessment; notebook entry
Investigation 7, Part 3: notebook entry; Investigation 7 I-Check

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to provide evidence for phenomena.

Populations and Ecosystems

Investigation 7, Part 1, pp. 497-508
- **SE:** *Milkweed Bug,* pp. 7-12; *Milkweed-Bug Hatching Investigation,* pp. 133-135
- **DR:** "Milkweed Bugs, Unlimited" "Milkweed Bugs, Limited"

Investigation 7, Part 2, pp. 512-527
- **SE:** *Algae and Brine Shrimp Experiments,* pp. 136-140

Investigation 7, Part 3, pp. 530-544
- **SE:** *Mono Lake Data,* pp. 141-144

Disciplinary Core Ideas

•Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.
•In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
•Growth of organisms and population increases are limited by access to resources.

Populations and Ecosystems

Investigation 7, Part 1, pp. 497-508
- **SE:** *Milkweed Bug,* pp. 7-12; *Milkweed-Bug Hatching Investigation,* pp. 133-135
- **DR:** "Milkweed Bugs, Unlimited" "Milkweed Bugs, Limited"

Investigation 7, Part 2, pp. 512-527
- **SE:** *Limiting Factors,* pp. 87-96, *Algae and Brine Shrimp Experiments,* pp. 136-140

Investigation 7, Part 3, pp. 530-544
- **SE:** *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Populations and Ecosystems

Investigation 7, Part 1, pp. 497-508
- **SE:** *Milkweed-Bug Hatching Investigation,* pp. 133-135
- **DR:** "Milkweed Bugs, Unlimited" "Milkweed Bugs, Limited"

Investigation 7, Part 2, pp. 512-527
- **SE:** *Limiting Factors,* pp. 87-96 , *Algae and Brine Shrimp Experiments,* pp. 136-140

Investigation 7, Part 3, pp. 530-544
- **SE:** *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Additional Science and Engineering Practices Addressed

Asking Questions
Developing and Using Models
Planning and Carrying Out Investigations
Using Mathematics and Computational Thinking
Constructing Explanations
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Systems and System Models
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 7.LS2.2

Students who demonstrate understanding can:

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Clarification Statement: Emphasis is on constructing explanations that predict consistent patterns of interactions in different ecosystems in terms of the relationships among and between living organisms and nonliving components of ecosystems. Examples of types of interactions could include competition, predation, parasitism, commensalism, mutualism. Assessment Boundary: N/A

Populations and Ecosystems Course

Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment; Investigation 3 I-Check
Investigation 4, Part 3: performance assessment
Investigation 7, Part 2: performance assessment
Investigation 7, Part 3: notebook entry; Investigation 7 I-Check
Investigation 8, Part 2: performance assessment

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Construct an explanation that includes qualitative or quantitative relationships between variables that predict and/or describe phenomena.

Populations and Ecosystems
TE: Investigation 3, Part 1, pp. 248-258
SE: *An Introduction to Mono Lake,* pp. 35-40
DR: The Mono Lake Story (Video)

Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"

Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 4, Part 3, pp. 328-334

Investigation 7, Part 2,
SE: *Limiting Factors,* pp. 87-96

Investigation 7, Part 3, pp. 530-544
SE: *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)

Disciplinary Core Ideas

Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.

Populations and Ecosystems
TE: Investigation 3, Part 1, pp. 248-258
SE: *An Introduction to Mono Lake,* pp. 35-40
DR: The Mono Lake Story (Video)
Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"
Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 4, Part 3, pp. 328-334

Investigation 7, Part 2, 512-527
SE: *Limiting Factors,* pp. 87-96
Investigation 7, Part 3, pp. 530-544
SE: *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)

Crosscutting Concepts

Patterns
Patterns can be used to identify cause and effect relationships.

Populations and Ecosystems
TE: Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"

Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 7, Part 2,
SE: *Limiting Factors,* pp. 87-96

Investigation 7, Part 3, pp. 530-544
SE: *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Additional Science and Engineering Practices Addressed Asking Questions; Developing and Using Models; Analyzing and Interpreting Data; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Energy and Matter; Stability and Change; Cause and Effect; Systems and System Models

GRADE 7

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 7.LS2.3

Students who demonstrate understanding can:
Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system. Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.

Populations and Ecosystems Course

Investigation 3, Part 1: notebook entry
Investigation 3, Part 2: response sheet
Investigation 3, Part 3: performance assessment; Investigation 3 I-Check
Investigation 5, Part 1: performance assessment
Investigation 5, Part 2: notebook entry
Investigation 5, Part 4: notebook entry; Investigation 5 I-Check
Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: performance assessment
Investigation 6, Part 3: response sheet
Investigation 6, Part 4: notebook entry; Investigation 6 I-Check

Science and Engineering Practices

Developing and Using Models
Develop a model to describe phenomena.

Populations and Ecosystems

TE: Investigation 3, Part 1, pp. 248-258
SE: *An Introduction to Mono Lake*, pp. 35-40
DR: The Mono Lake Story (Video)

Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"

Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 5, Part 1, pp. 359-367

Investigation 5, Part 2, pp.371-382
SE: *Energy and Life*, pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Investigation 6, Part 1, pp. 424-429

Investigation 6, Part 2, pp. 434-445
SE: *Rachel Carson and the Silent Spring*, pp. 70-74

Investigation 6, Part 3, pp. 451-459
SE: *Trophic Levels*, pp. 73-82

Disciplinary Core Ideas

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem.
- Transfers of matter into and out of the physical environment occur at every level.
- Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments.
- The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

Populations and Ecosystems

TE: Investigation 3, Part 1, pp. 248-258
SE: *An Introduction to Mono Lake*, pp. 35-40
DR: The Mono Lake Story (Video)

Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"

Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 5, Part 1, pp. 359-367

Investigation 5, Part 2, pp.371-382
SE: *Energy and Life*, pp. 51-55, *Where*

Crosscutting Concepts

Energy and Matter
The transfer of energy can be tracked as energy flows through a natural system.

Populations and Ecosystems

TE: Investigation 3, Part 2, pp. 263-271
DR: "Mono Lake Food Web"

Investigation 3, Part 3, pp. 276-281
DR: "Ecoscenarios"
"Organism Database"

Investigation 5, Part 1, pp. 359-367

Investigation 5, Part 2, pp.371-382
SE: *Energy and Life*, pp. 51-55, *Where Does Food Come From?* Pp. 56-61

Investigation 5, Part 4, pp. 394-402

Investigation 6, Part 1, pp. 424-429

Investigation 6, Part 2, pp. 434-445
SE: *Rachel Carson and the Silent Spring*, pp. 70-74

Investigation 6, Part 3, pp. 451-459
SE: *Trophic Levels*, pp. 73-82

Investigation 6, Part 4, pp. 472-477
SE: *Decomposers*, pp.83-86

	Does Food Come From? Pp. 56-61 Investigation 5, Part 4, pp. 394-402 Investigation 6, Part 1, pp. 424-429 Investigation 6, Part 2, pp. 434-445 **SE:** *Rachel Carson and the Silent Spring,* pp. 70-74 Investigation 6, Part 3, pp. 451-469 **SE:** *Trophic Levels,* pp. 73-82 Investigation 6, Part 4, pp. 472-477 **SE:** *Decomposers,* pp.83-86	

Additional Science and Engineering Practices Addressed

Asking Questions and Defining Problems
Analyzing and Interpreting Data
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity

GRADE 7

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 7.LS2.4

Students who demonstrate understanding can:
Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems. Assessment Boundary: N/A

Populations and Ecosystems Course
- Investigation 7, Part 1: notebook entry
- Investigation 7, Part 2: performance assessment
- Investigation 7, Part 3: notebook entry
- Investigation 8, Part 1: notebook entry
- Investigation 8, Part 2: performance assessment
- Investigation 8, Part 3: notebook entry; Investigation 8 I-Check
- Investigation 9, Part 1: performance assessment
- Investigation 9, Part 2: performance assessment
- Investigation 9, Part 3: performance assessment

Science and Engineering Practices

Engaging in Argument from Evidence
Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or model for a phenomenon.

Populations and Ecosystems
TE: Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96

Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Disciplinary Core Ideas

•Ecosystems are dynamic in nature; their characteristics can vary over time.
•Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

Populations and Ecosystems
TE: Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96
Investigation 7, Part 3, pp. 530-544
SE: *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Investigation 8, Part 1, pp. 565-582
SE: *Biodiversity,* pp. 100-107
Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)
Investigation 8, Part 3, pp. 593-605
SE: *Mono Lake in the Spotlight,* pp. 118-122
DR: The Mono Lake Story (Video)

Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions*
DR: "Ecoscenario Research Center"
Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Crosscutting Concepts

Stability and Change
Small changes in one part of a system might cause large changes in another part.

Populations and Ecosystems
TE: Investigation 7, Part 1, pp. 497-508
SE: *Milkweed Bugs,* pp. 7-12, *Milkweed-Bug Hatching Investigation,* pp. 133-135
Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96
Investigation 7, Part 3, pp. 530-544
SE: *Mono Lake Data,* pp. 141-144; *Mono Lake throughout the Year,* pp. 97-99

Investigation 8, Part 1, pp. 565-582
SE: *Biodiversity,* pp. 100-107
Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)
Investigation 8, Part 3, pp. 593-605
SE: *Mono Lake in the Spotlight,* pp. 118-122
DR: The Mono Lake Story (Video)

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed Patterns; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Ecosystems: Interactions, Energy, and Dynamics

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

Performance Expectation 7.LS2.5

Students who demonstrate understanding can:

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*

Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations. Assessment Boundary :N/A

Populations and Ecosystems Course

Investigation 8, Part 1: notebook entry
Investigation 8, Part 2: performance assessment
Investigation 8, Part 3: notebook entry; Investigation 8 I-Check
Investigation 9, Part 1: performance assessment
Investigation 9, Part 2: performance assessment
Investigation 9, Part 3: performance assessment

Science and Engineering Practices

Engaging in Argument from Evidence
Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

Populations and Ecosystems
TE: Investigation 8, Part 2, pp. 585-590
DR: Hawaii: Strangers in Paradise (Video)
Investigation 8, Part 3, pp. 593-605
SE: *Mono Lake in the Spotlight,* pp
DR: The Mono Lake Story (Video)

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Disciplinary Core Ideas

•Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems.
•The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.
•Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.
•There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.

Populations and Ecosystems
TE: Investigation 8, Part 1, pp. 565-582
SE: *Biodiversity,* pp. 100-107
Investigation 8, Part 2, pp. 585-590
SE: *Invasive Species,* pp. 108-117
DR: Hawaii: Strangers in Paradise (Video)
Investigation 8, Part 3, pp. 593-605
SE: *Mono Lake in the Spotlight,* pp. 118-122
DR: The Mono Lake Story (Video)

Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"
Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Crosscutting Concepts

Stability and Change
Small changes in one part of a system might cause large changes in another part.

Populations and Ecosystems
TE: Investigation 8, Part 1, pp. 565-582
SE: *Biodiversity,* pp. 100-107
Investigation 8, Part 2, pp. 585-590
SE: *Invasive Species,* pp. 108-117
DR: Hawaii: Strangers in Paradise (Video)
Investigation 8, Part 3, pp. 593-605
SE: *Mono Lake in the Spotlight,* pp. 118-122
DR: The Mono Lake Story (Video)

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"
Investigation 9, Part 3, pp. 641-649

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Earth and Human Activity

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

Performance Expectation 7.ESS3.1

Students who demonstrate understanding can:
Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geological traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock). Assessment Boundary: N/A

Earth History Course
Digital Resources

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Apply scientific ideas, principles, and evidence (including students' own investigations, models, theories, simulations, peer review) to provide an explanation of phenomena. **Earth History** **TE:** Investigation 8, Parts 1 and 2 **DR:** "Geoscenarios"	•Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. •Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. •These resources are distributed unevenly around the planet as a result of past geologic processes. **Earth History** **TE:** Investigation 8, Parts 1 and 2 **DR:** "Geoscenarios"	**Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. **Earth History** **TE:** Investigation 8, Parts 1 and 2 **DR:** "Geoscenarios"

GRADE 7

Earth and Human Activity

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

Performance Expectation 7.ESS3.3

Students who demonstrate understanding can:
Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.*

Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land). Assessment Boundary: N/A

Populations and Ecosystems Course
Investigation 9, Part 1: performance assessment
Investigation 9, Part 2: performance assessment
Investigation 9, Part 3: performance assessment

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Apply scientific principles to design an object, tool, process, or system.

Populations and Ecosystems
TE: Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"

Investigation 9, Part 3, pp. 641-649

Disciplinary Core Ideas

•Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.
•Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Populations and Ecosystems
TE: Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"

Investigation 9, Part 3, pp. 641-649

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Populations and Ecosystems
TE: Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. `6-30
DR: "Ecoscenario Research Center"

Investigation 9, Part 2, pp. 633-637
DR: "Ecoscenario Research Center"

Investigation 9, Part 3, pp. 641-649

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 7

Earth and Human Activity

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

Performance Expectation 7.ESS3.4

Students who demonstrate understanding can:
Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy).Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes. Assessment Boundary: N/A

Earth History Course
Investigation 8, Part 1
Investigation 8, Part 2: notebook entry
Investigation 8, Part 3: performance assessment

Populations and Ecosystems Course
Investigation 8, Part 1: notebook entry

Science and Engineering Practices

Engaging in Argument from Evidence
Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or model for a phenomenon.

Earth History
TE: Investigation 8, Part 3, pp. 629-633 (Investigations 8, Parts 1 and 2 provide information for this practice).

Populations and Ecosystems
TE: Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-107

Disciplinary Core Ideas

•Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Earth History
TE: Investigation 8, Part 1, pp. 612-617
SE: *Geoscenario Introduction: Glaciers,* pp. 99-103; *Geoscenario Introduction: Coal,* pp. 104-108; *Geoscenario Introduction: Yellowstone Hotspot,* pp. 109-113; *Geoscenario Introduction: Oil,* pp. 114-118
DR: "Geoscenarios"

Investigation 8, Part 2, pp. 620-625
SE: Same as Investigation 8, Part 1
DR: "Geoscenarios," "Timeliner," "Rock Column Movie Maker"

Investigation 8, Part 3, pp. 629-633

Populations and Ecosystems
TE: Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-107

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Populations and Ecosystems
TE: Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-107

Earth History
TE: Investigation 8, Part 1, pp. 612-617
SE: *Geoscenario Introduction: Glaciers,* pp. 99-103; *Geoscenario Introduction: Coal,* pp. 104-108; *Geoscenario Introduction: Yellowstone Hotspot,* pp. 109-113; *Geoscenario Introduction: Oil,* pp. 114-118
DR: "Geoscenarios"

Investigation 8, Part 2, pp. 620-625
SE: Same as Investigation 8, Part 1
DR: "Geoscenarios," "Timeliner," "Rock Column Movie Maker"

Investigation 8, Part 3, pp. 629-633

Additional Science and Engineering Practices Addressed Developing and Using Models; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Patterns; Stability and Change; Systems and System Models; Scale, Proportion, and Quantity

GRADE 7

Earth and Human Activity

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

Performance Expectation 7.ESS3.5

Students who demonstrate understanding can:
Obtain, evaluate, and communicate evidence of the factors that have caused changes in global temperatures over the past century.

Clarification Statement: Examples of evidence can include tables, graphs, and maps of global and regional temperatures; atmospheric levels of gases such as carbon dioxide and methane; and the impact humans have on the environment. Assessment Boundary: N/A

Populations and Ecosystems Course
Investigation 7, Part 4: performance assessment
Investigation 8, Part 1
Investigation 9, Part 1: performance assessment

Earth History Course
Investigation 8, Part 1: notebook entry
Investigation 8, Part 2: notebook entry
Investigation 8, Part 3: performance assessment

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Gather, read, synthesize information from multiple appropriate sources, and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence

Populations and Ecosystems
TE: Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96

Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-582

Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"

Earth History
TE: Investigation 8, Part 2, pp. 620-625
SE: Same as Investigation 8, Part 1
DR: "Geoscenarios," "Timeliner," "Rock Column Movie Maker"

Investigation 8, Part 3, pp. 629-633

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Disciplinary Core Ideas

•Understanding atmospheric changes and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge(such as understanding of human behavior)and on applying that knowledge wisely in decisions and activities.

Populations and Ecosystems
TE: Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96

Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-582

Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"

Earth History
TE: Investigation 8, Part 1, pp. 612-617
SE: *Geoscenario Introduction: Glaciers,* pp. 99-103; *Geoscenario Introduction: Coal,* pp. 104-108; *Geoscenario Introduction: Yellowstone Hotspot,* pp. 109-113; *Geoscenario Introduction: Oil,* pp. 114-118
DR: "Geoscenarios"
Investigation 8, Part 2, pp. 620-625
SE: Same as Investigation 8, Part 1
DR: "Geoscenarios," "Timeliner," "Rock Column Movie Maker"
Investigation 8, Part 3, pp. 629-633

Crosscutting Concepts

Stability and Change
Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

Populations and Ecosystems
TE: Investigation 7, Part 2, pp. 512-527
SE: *Limiting Factors,* pp. 87-96

Investigation 8, Part 1, pp. 573-582
SE: *Biodiversity,* pp. 100-582

Investigation 9, Part 1, pp. 623-629
SE: *Ecoscenario Introductions,* pp. 16-30
DR: "Ecoscenario Research Center"

Earth History
TE: Investigation 8, Part 2, pp. 620-625
SE: Same as Investigation 8, Part 1
DR: "Geoscenarios," "Timeliner," "Rock Column Movie Maker"
Investigation 8, Part 3, pp. 629-633

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking
Additional Crosscutting Concepts Addressed Patterns; Energy and Matter; Cause and Effect; Systems and System Models; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Motion and Stability: Forces and Interactions

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

Performance Expectation 8.PS2.1

Students who demonstrate understanding can:
Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects in a system.*

Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle. Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.

Gravity and Kinetic Energy Course
Investigation 3, Part 1: performance assessment, notebook entry
Investigation 3, Part 2: notebook entry
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check
Investigation 4, Part 1: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Apply scientific principles to design an object, tool, process, or system. ***Gravity and Kinetic Energy*** **TE:** Investigation 4, Part 1, pp. 271-287 **SE:** *Engineering a Safer Car,* pp. 50-56; *Collisions and Concussions,* pp. 57-62 **DR:** Understanding Car Crashes (Video)	•For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). ***Gravity and Kinetic Energy*** **TE:** Investigation 3, Part 1, pp. 213-229 **SE:** *Potential and Kinetic Energy,* pp. 37-40 Investigation 3, Part 2, pp. **SE:** *Avoiding Collisions,* pp. 41-44 Investigation 3, Part 3, **SE:** *Newton's Laws,* pp. 45-49 Investigation 4, Part 1, pp. 271-287 **SE:** *Engineering a Safer Car,* pp. 50-56; *Collisions and Concussions,* pp. 57-62 **DR:** Understanding Car Crashes (Video)	**Systems and System Models** Models can be used to represent systems and their interactions(such as inputs, processes, and outputs) and energy, matter, and information flows within the systems. ***Gravity and Kinetic Energy*** **TE:** Investigation 3, Part 1, pp. 213-229 **SE:** *Potential and Kinetic Energy,* pp. 37-40 Investigation 4, Part 1, pp. 271-287 **SE:** *Engineering a Safer Car,* pp. 50-56; *Collisions and Concussions,* pp. 57-62 **DR:** Understanding Car Crashes (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Stability and Change
Cause and Effect
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Motion and Stability: Forces and Interactions

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

Performance Expectation 8PS2.2

Students who demonstrate understanding can:

Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Clarification Statement: Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law);frame of reference; and specification of units. An increase in force can be caused by increasing the mass, the acceleration ,or both the mass and acceleration of an object. An example of evidence could include reasoning from mathematical expressions (F=ma).Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.

Electromagnetic Force Course

Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 1, Part 3: response sheet

Gravity and Kinetic Energy Course

Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 1, Part 3: notebook entry; Investigation 1 I-Check
Investigation 2, Part 1: performance assessment
Investigation 2, Part 2: notebook entry
Investigation 3, Part 1: performance assessment
Investigation 3, Part 2: notebook entry
Investigation 3, Part 3: notebook entry; Investigation 3 I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
Plan an investigation individually and collaboratively; identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.

Electromagnetic Force
TE: Investigation 1, Part 2, pp. 112-117
SE: *The Discovery of Friction,* pp. 8-14

Gravity and Kinetic Energy
TE: Investigation 1, Part 3, pp. 126-147
DR: Falling Ball (Video), Hammer and Feather in Space (Video), "Movie Tracker," "Movie Tracker Data," "Falling Ball Analysis"

Investigation 2, Part 1, pp. 164-175

Investigation 2, Part 2, pp. 178-195
SE: *Gravity in Space,* pp. 31-36

Investigation 3, Part 1, pp. 215-223

Disciplinary Core Ideas

•The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero its motion will change.
•The greater the mass of the object, the greater the force needed to achieve the same change in motion.
•For any given object, a larger force causes a larger change in motion.

Electromagnetic Force
TE: Investigation 1, Part 1, pp. 97-108
SE: *The Force is with You,* pp. 2-7

Investigation 1, Part 2, pp. 112-117
SE: *The Discovery of Friction,* pp. 8-14

Investigation 1, Part 3, pp. 121-134
SE: *Net Force,* pp. 15-18
DR: Forces (Video)

Gravity and Kinetic Energy
TE: Investigation 1, Part 1, pp. 97-107
SE: *How Fast Do Things Go?* pp. 3-10

Crosscutting Concepts

Stability and Change
Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.

Electromagnetic Force
TE: Investigation 1, Part 3, pp. 121-134
SE: *Net Force,* pp. 15-18
DR: Forces (Video)

Gravity and Kinetic Energy
TE: Investigation 2, Part 2, pp. 178-195
SE: *Gravity in Space,* pp. 31-36

Investigation 3, Part 3, pp. 243-255
SE: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46
DR: "Virtual Magnet"

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Investigation 3, Part 2, pp. 230-241 Investigation 3, Part 3, pp. 243-255 **SE**: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46 **DR:** "Virtual Magnet"	Investigation 1, Part 2, pp. 111-121 **SE:** *Faster and Faster,* pp. 11-17 Investigation 1, Part 3, pp. 126-147 **SE**: *Gravity: It's the Law,* pp. 18-25 **DR:** Falling Ball (Video), Hammer and Feather in Space (Video), "Movie Tracker," "Movie Tracker Data," "Falling Ball Analysis" Investigation 2, Part 1, pp. 164-175 **SE:** *A Weighty Matter,* pp. 26-30 Investigation 2, Part 2, pp. 178-195 **SE:** *Gravity in Space,* pp. 31-36 Investigation 3, Part 1, pp. 215-223 **SE:** *Potential and Kinetic Energy,* pp. 37-40 Investigation 3, Part 2, pp. 230-241 **SE**: *Electromagnetism,* pp. 38-41 Investigation 3, Part 3, pp. 243-255 **SE**: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46 **DR:** "Virtual Magnet"	

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

GRADE 8

Motion and Stability: Forces and Interactions

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

Performance Expectation 8.PS2.3

Students who demonstrate understanding can:

Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor. Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning. Assessment of Coulomb's Law is not intended.

Electromagnetic Force Course

Investigation 3, Part 2: notebook entry
Investigation 3, Part 3: performance assessment; Investigation 3 I-Check
Investigation 4, Part 1: notebook entry
Investigation 4, Part 2: performance assessment

Science and Engineering Practices

Asking Questions and Defining Problems
Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.

Electromagnetic Force

TE: Investigation 3, Part 2, pp. 230-241
SE: *Electromagnetism,* pp. 38-41

Investigation 3, Part 3, pp. 243-255
SE: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46
DR: "Virtual Magnet"

Investigation 4, Part 1, pp. 273-280
SE: *Motor Dissection A,* p. 69; *Motor Dissection B,* p. 70

Investigation 4, Part 2, pp. 287-302
SE: *Where We Get Energy",* pp. 56-62; *The Rebirth of Electric Cars,* pp. 47-55; *Generator Dissection,* p. 72
DR: Generator Dissection (Video)

Disciplinary Core Ideas

•Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects.

Electromagnetic Force

TE: Investigation 3, Part 2, pp. 230-241
SE: *Electromagnetism,* pp. 38-41

Investigation 3, Part 3, pp. 243-255
SE: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46
DR: "Virtual Magnet"

Investigation 4, Part 1, pp. 273-280
SE: *Motor Dissection A,* p. 69; *Motor Dissection B,* p. 70

Investigation 4, Part 2, pp. 287-302
SE: *Where We Get Energy",* pp. 56-62; *The Rebirth of Electric Cars,* pp. 47-55; *Generator Dissection,* p. 72
DR: Generator Dissection (Video)

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Electromagnetic Force

TE: Investigation 3, Part 3, pp. 243-255
SE: *Engineering Design Process,* p. 68; *Electromagnetic Engineering,* pp.42-46
DR: "Virtual Magnet"

Investigation 4, Part 2, pp. 287-302
SE: *Where We Get Energy",* pp. 56-62; *The Rebirth of Electric Cars,* pp. 47-55; *Generator Dissection,* p. 72
DR: Generator Dissection (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Energy and Matter
Stability and Change
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Motion and Stability: Forces and Interactions

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

Performance Expectation 8.PS2.4

Students who demonstrate understanding can:

Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system. Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws. Assessment should be focused on qualitative observations and data, or other quantitative data that does not require mathematical computations beyond basic central tendencies.

Gravity and Kinetic Energy Course

Investigation 1, Part 3: notebook entry; Investigation 1 I-Check
Investigation 2, Part 2: notebook entry; Investigation 2 I-Check

Planetary Science Course

Investigation 6, Part 2: performance assessment

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

Gravity and Kinetic Energy

TE: Investigation 1, Part 3, pp. 126-147
SE: *Gravity: It's the Law,* pp. 18-25
DR: Falling Ball (Video), Hammer and Feather in Space (Video), "Movie Tracker," "Movie Tracker Data," "Falling Ball Analysis"

Investigation 2, Part 2, pp. 178-195
SE: *Gravity in Space,* pp. 31-36

Planetary Science

TE: Investigation 6, Part 2, pp. 404-422
SE: *How the Earth Got and Held onto Its Moon; Sun, Planets, and Satellites In the Solar System,* p. 135
DR: "Solar System Origin Card Sort," "Origin of the Moon," Tides

Disciplinary Core Ideas

•Gravitational forces are always attractive.
•There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass (e.g., Earth and the sun).

Gravity and Kinetic Energy

TE: Investigation 1, Part 3, pp. 126-147
SE: *Gravity: It's the Law,* pp. 18-25
DR: Falling Ball (Video), Hammer and Feather in Space (Video), "Movie Tracker," "Movie Tracker Data," "Falling Ball Analysis"

Investigation 2, Part 2, pp. 178-195
SE: *Gravity in Space,* pp. 31-36

Planetary Science

TE: Investigation 6, Part 2, pp. 404-422
SE: *How the Earth Got and Held onto Its Moon; Sun, Planets, and Satellites in the Solar System,* p. 135
DR: "Solar System Origin Card Sort," "Origin of the Moon," Tides

Crosscutting Concepts

Systems and System Models
Models can be used to represent systems and their interactions(such as inputs, processes and outputs) and energy and matter flows within systems.

Gravity and Kinetic Energy

TE: Investigation 1, Part 3, pp. 126-147
SE: *Gravity: It's the Law,* pp. 18-25
DR: Falling Ball (Video), Hammer and Feather in Space (Video), "Movie Tracker," "Movie Tracker Data," "Falling Ball Analysis"

Investigation 2, Part 2, pp. 178-195
SE: *Gravity in Space,* pp. 31-36

Additional Science and Engineering Practices Addressed Developing and Using Models; Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Patterns; Stability and Change; Energy and Matter; Cause and Effect; Scale, Proportion, and Quantity; Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Motion and Stability: Forces and Interactions

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

Performance Expectation 8.PS2.5

Students who demonstrate understanding can:

Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically charged balloons. Examples of investigations could include first-hand experiences or simulations. Assessment Boundary: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.

Electromagnetic Force Course

Investigation 2, Part 2: response sheet
Investigation 2, Part 3: performance assessment

Gravity and Kinetic Energy Course

Investigation 2, Part 2: notebook entry; Investigation 2 I-Check

Science and Engineering Practices

Planning and Carrying Out Investigations
Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation.

Electromagnetic Force
TE: Investigation 2, Part 2, pp. 163-177
SE: *Magnetic Force,* pp. 19-24
DR: Magnetism (Video)

Investigation 2, Part 3, pp. 180-190
DR: "Adding Magnetic Fields" (Online Activity)

Disciplinary Core Ideas

•Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively).

Electromagnetic Force
TE: Investigation 2, Part 2, pp. 163-177
SE: *Magnetic Force,* pp. 19-24
DR: Magnetism (Video)

Investigation 2, Part 3, pp. 180-190
DR: "Adding Magnetic Fields"

Gravity and Kinetic Energy
TE: Investigation 2, Part 2, pp. 178-196
SE: *Gravity in Space,* pp. 31-36

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Electromagnetic Force
TE: Investigation 2, Part 2, pp. 163-177
SE: *Magnetic Force,* pp. 19-24
DR: Magnetism (Video)

Gravity and Kinetic Energy
TE: Investigation 2, Part 2, pp. 178-196
SE: *Gravity in Space,* pp. 31-36

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Systems and System Models
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 8.PS4.1

Students who demonstrate understanding can:
Use mathematical representations to describe patterns in a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking. Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.

Waves Course
Investigation 1, Part 1: notebook entry
Investigation 1, Part 2: performance assessment
Investigation 2, Part 1: notebook entry
Investigation 2, Part 3: performance assessment; Investigations 1-2 I-Check

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematical and Computational Thinking Use mathematical representation to describe and/or support scientific conclusions and design solutions. ***Waves*** **TE:** Investigation 1, Part 1, pp.93-98 Investigation 1, Part 2, pp. 102-111 **SE:** *Transverse and Compression Waves,* p. 81 **DR:** Standing Wave (Video), "Metronome"	•A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. ***Waves*** **TE:** Investigation 1, Part 1, pp.93-98 Investigation 1, Part 2, pp. 102-111 **SE:** *Transverse and Compression Waves,* p. 81 **DR:** Standing Wave (Video), "Metronome" Investigation 2, Part 1, pp. 129-140 **SE:** *Ocean Waves,* pp. 3-6; *Tsunamis!* Pp. 7-11 **DR:** Big Waves (Video) Investigation 2, Part 3, pp. 161-163; p. 166, pp. 168-172 **SE**: *Sound Waves,* pp. 17-20 **DR**: "Oscilloscope"	**Patterns** Graphs and charts can be used to identify patterns in data. ***Waves*** **TE:** Investigation 1, Part 1, pp.93-98 Investigation 1, Part 2, pp. 102-111 **SE:** *Transverse and Compression Waves,* p. 81 **DR:** Standing Wave (Video), "Metronome" Investigation 2, Part 1, pp. 129-140 **SE:** *Ocean Waves,* pp. 3-6; *Tsunamis!* Pp. 7-11 **DR:** Big Waves (Video)

Additional Science and Engineering Practices Addressed
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Energy and Matter
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Waves and Their Applications in Technologies for Information Transfer

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

Performance Expectation 8.PS4.3

Students who demonstrate understanding can:

Integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.*

Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in WIFI devices, and conversion of stored binary patterns to make sound or text on a computer screen. Examples of reliability in encoding could include transmitting digital information at a higher quality than analog signals (digital vs. analog photographs or videos, or digital vs. analog thermometer). Examples of reliability in transmission could include the degradation of an analog signal compared to a digital signal. Assessment Boundary: Assessment does not include binary counting or the specific mechanism of any given device.

Waves Course

Investigation 4, Part 1: notebook entry
Investigation 4, Part 2: notebook entry
Investigation 4, Part 3: notebook entry; Investigation 4 I-Check

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information
Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings.

Waves
TE: Investigation 4, Part 1, pp. 262-266
SE: *Lasers,* pp. 58-62
DR: Fiber Optics (Video)

Investigation 4, Part 2, pp. 269-276
SE: *Amplitude and Frequency Modulation,* p. 86

Investigation 4, Part 3, pp. 279-295
SE: *Digital Communication,* pp. 63-68; *Telecommunication: From Telegraph to Smartphone,* pp. 69-78
DR: *Digitized Images*

Disciplinary Core Ideas

•Many modern communications devices use digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

Waves
TE: Investigation 4, Part 1, pp. 262-266
SE: *Lasers,* pp. 58-62
DR: Fiber Optics (Video)

Investigation 4, Part 2, pp. 269-276
SE: *Amplitude and Frequency Modulation,* p. 86

Investigation 4, Part 3, pp. 279-295
SE: *Digital Communication,* pp. 63-68; *Telecommunication: From Telegraph to Smartphone,* pp. 69-78
DR: *Digitized Images*

Crosscutting Concepts

Structure and Function
Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Waves
TE: Investigation 4, Part 1, pp. 262-266
SE: *Lasers,* pp. 58-62
DR: Fiber Optics (Video)

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Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Using Mathematical and Computational Thinking

Additional Crosscutting Concepts Addressed

Patterns
Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 8.LS1.4

Students who demonstrate understanding can:

Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury. Assessment Boundary: Assessment should not focus on the identification of the reproductive plant structures.

Diversity of Life Module

Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: performance assessment
Investigation 6, Part 3: response sheet
Investigation 6, Part 4: notebook entry; Investigation 6 I-Check
Investigation 8, Part 1: performance assessment

Science and Engineering Practices

Engaging in Argument from Evidence
Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for phenomena.

Diversity of Life
TE: Investigation 6, Part 2, pp. 467-474
SE: *Breeding Salt-Tolerant Wheat*
Investigation 6, Part 3, pp. 479-489
SE: *The Making of a New Plant,* pp. 62-64; *Seeds on the Move,* pp. 65-72
DR: "Nonflowering-Plant Reproduction," "Database: Seed Collection"
Investigation 6, Part 4, pp. 495-498
SE: *Flower Information,* pp. 122-125; *Flowers and Pollinators,* pp. 126-133

Investigation 8, Part 1, pp. 572-578, 582
SE: *Those Amazing Insects,* pp. 81-89; *Insect Structures and Functions,* pp. 134-142
DR: "Database: Insect Collection"

Disciplinary Core Ideas

•Animals engage in characteristic behaviors that increase the odds of reproduction.
•Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.

Diversity of Life
TE: Investigation 6, Part 1, pp. 456-459
Investigation 6, Part 2, pp. 467-474
SE: *Breeding Salt-Tolerant Wheat*
Investigation 6, Part 3, pp. 479-489
SE: *The Making of a New Plant,* pp. 62-64; *Seeds on the Move,* pp. 65-72
DR: "Nonflowering-Plant Reproduction," "Database: Seed Collection"
Investigation 6, Part 4, pp. 495-500
SE: *Flower Information,* pp. 122-125; *Flowers and Pollinators,* pp. 126-133
DR: "Database: Pollinator Collector," "Pollinators Game"

Investigation 8, Part 1, pp. 572-582
SE: *Those Amazing Insects,* pp. 81-89, *Insect Structures and Functions,* pp. 134-142
DR: "Database: Insect Collection"

Crosscutting Concepts

Cause and Effect
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Diversity of Life
TE: Investigation 6, Part 2, pp. 467-474
SE: *Breeding Salt-Tolerant Wheat*
Investigation 6, Part 4, pp. 495-500
SE: *Flower Information,* pp. 122-125; *Flowers and Pollinators,* pp. 126-133
DR: "Database: Pollinator Collector," "Pollinators Game"

Investigation 8, Part 1, pp. 572-582
SE: *Those Amazing Insects,* pp. 81-89; *Insect Structures and Functions,* pp. 134-142
DR: "Database: Insect Collection"

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Systems and System Models
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

From Molecules to Organisms: Structure and Processes

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

Performance Expectation 8.LS1.5

Students who demonstrate understanding can:
Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds. Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.

Diversity of Life Course
Investigation 6, Part 2: performance assessment
Investigation 6, Part 3: response sheet
Investigation 6, Part 4: notebook entry; Investigation 6 I-Check

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

Diversity of Life
TE: Investigation 6, Part 2, pp. 467-474
SE: *Breeding Salt-Tolerant Wheat*

Investigation 6, Part 3, pp. 479-489
SE: *The Making of a New Plant,* pp. 62-64; *Seeds on the Move,* pp. 65-72
DR: "Nonflowering-Plant Reproduction

Investigation 6, Part 4, pp. 495-500
SE: *Flower Information,* pp. 122-125; *Flowers and Pollinators,* pp. 126-133
DR: "Database: Pollinator Collector," "Pollinators Game"

Disciplinary Core Ideas

•Genetic factors, as well as local conditions, affect the growth of the adult plant.

Diversity of Life
TE: Investigation 6, Part 2, pp. 467-474
SE: *Breeding Salt-Tolerant Wheat*

Investigation 6, Part 3, pp. 479-489
SE: *The Making of a New Plant,* pp. 62-64; *Seeds on the Move,* pp. 65-72
DR: "Nonflowering-Plant Reproduction

Investigation 6, Part 4, pp. 495-500
SE: *Flower Information,* pp. 122-125; *Flowers and Pollinators,* pp. 126-133
DR: "Database: Pollinator Collector," "Pollinators Game"

Crosscutting Concepts

Cause and Effect
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Diversity of Life
TE: Investigation 6, Part 2, pp. 467-473
SE: *Breeding Salt-Tolerant Wheat*

Investigation 6, Part 3, pp. 479-489
SE: *Seeds on the Move,* pp. 65-72

Investigation 6, Part 4, pp. 495-500
SE: *Flowers and Pollinators,* pp. 126-133

Additional Science and Engineering Practices Addressed
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Engaging in Argument from Evidence
Planning and Carrying Out Investigations
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Patterns
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 8.LS3.1

Students who demonstrate understanding can:

Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins. Examples: Radiation treated plants, genetically modified organisms (e.g. roundup resistant crops, bioluminescence), mutations both harmful and beneficial. Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.

Heredity and Adaptation Course
Investigation 3, Part 1: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe phenomena.

Heredity and Adaptation
TE: Investigation 3, Part 1, pp. 250-272
SE: *Adaptation,* pp. 41-52
DR: *"Walking Sticks: Eat Insects"*

Disciplinary Core Ideas

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual.
- Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits.
- In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations.
- Though rare, mutations may result in changes to the structure and function of proteins.
- Some changes are beneficial, others harmful, and some neutral to the organism.

Heredity and Adaptation
TE: Investigation 3, Part 1, pp. 250-272
SE: *Adaptation,* pp. 41-52
DR: *"Walking Sticks: Eat Insects"*

Crosscutting Concepts

Structure and Function
Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore complex natural structures/systems can be analyzed to determine how they function.

Heredity and Adaptation
TE: Investigation 3, Part 1, pp. 250-256
DR: *"Walking Sticks: Eat Insects"*

Additional Science and Engineering Practices Addressed

Analyzing and Interpreting Data
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Cause and Effect

GRADE 8

Heredity: Inheritance and Variation of Traits

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

Performance Expectation 8.LS3.2

Students who demonstrate understanding can:

Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation. Assessment Boundary: The assessment should measure the students' abilities to explain the general outcomes of sexual versus asexual reproduction in terms of variation seen in the offspring.

Heredity and Adaptation Course

Investigation 2, Part 2: notebook entry
Investigation 2, Part 3: response sheet
Investigation 2, Part 4: notebook entry, Investigation 2 I-Check

Diversity of Life Course

Investigation 7, Part 1: notebook entry
Investigation 7, Part 2: notebook entry; Investigation 7 I-Check

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe phenomena.

Heredity and Adaptation

TE: Investigation 2, Part 2, pp. 180-199
SE: *Understanding Heredity,* pp. 22-27; *A Larkey Yammer,* pp. 82-83
DR: "Heredity"
Investigation 2, Part 3, pp. 203-208
DR: "A Model for Predicting Genetic Variation;" "Larkey Impossible Traits"
Investigation 2, Part 4, pp. 212-230
SE: *Mendel and Punnett Squares,* pp. 28-35; *Mapping the Human Genome,* pp. 36-40
DR: "A Model for Predicting Genetic Variation," "Larkey Punnett Squares"

Diversity of Life

TE: Investigation 7, Part 1, pp. 521- 531
DR: *Genes and Heredity* (Video)
Investigation 7, Part 2, pp. 533-551
SE: *Mendel and Punnett Squares,* pp. 73-80
DR: *Genes and Heredity* (Video)

Disciplinary Core Ideas

•Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
•Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.
•In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other.

Heredity and Adaptation

TE: Investigation 2, Part 2, pp. 180-199
SE: *Understanding Heredity,* pp. 22-27; *A Larkey Yammer,* pp. 82-83
DR: "Heredity"
Investigation 2, Part 3, pp. 203-208
DR: "A Model for Predicting Genetic Variation;" "Larkey Impossible Traits"
Investigation 2, Part 4, pp. 212-230
SE: *Mendel and Punnett Squares,* pp. 28-35; *Mapping the Human Genome,* pp. 36-40
DR: "A Model for Predicting Genetic Variation," "Larkey Punnett Squares"

Diversity of Life

TE: Investigation 7, Part 1, pp. 521- 531
DR: *Genes and Heredity* (Video)
Investigation 7, Part 2, pp. 533-551
SE: *Mendel and Punnett Squares,* pp. 73-80
DR: *Genes and Heredity* (Video)

Crosscutting Concepts

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural systems.

Heredity and Adaptation

TE: Investigation 2, Part 2, pp. 180-199
SE: *Understanding Heredity,* pp. 22-27; *A Larkey Yammer,* pp. 82-83
DR: "Heredity"
Investigation 2, Part 4, pp. 212-230
SE: *Mendel and Punnett Squares,* pp. 28-35; *Mapping the Human Genome,* pp. 36-40
DR: "A Model for Predicting Genetic Variation," "Larkey Punnett Squares"

Diversity of Life

TE: Investigation 7, Part 1, pp. 521- 531
DR: *Genes and Heredity* (Video)
Investigation 7, Part 2, pp. 533-551
SE: *Mendel and Punnett Squares,* pp. 73-80
DR: *Genes and Heredity* (Video)

Additional Science and Engineering Practices Addressed Analyzing and Interpreting Data; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Patterns

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.1

Students who demonstrate understanding can:

Analyze and interpret data to identify patterns within the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth.

Clarification Statement: Emphasis is on finding patterns of change in the complexity of anatomical structures in organisms and the chronological order of fossils' appearance in the rock layers. The natural laws that operate today are assumed to operate as they have in the past. Assessment Boundary: Assessment does not include the names of individual species or geological time scales in the fossil record.

Heredity and Adaptation Course

Investigation 1, Part 1: quick write
Investigation 1, Part 2: notebook entry, Investigation 1 I-Check

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to determine similarities and differences in findings.

Heredity and Adaptation
TE: Investigation 1, Part 1, pp, 92-108
SE: *Fossil Dating,* pp. 3-10, *Mass Extinctions,* pp. 73-77
DR: "Biodiversity," "Fossils"

Investigation 1, Part 2, pp. 114
SE: *An Interview with Jennifer Clack,* pp. 11-16; *Transitions,* pp. 78-81
DR: Fish with Fingers (Video), Great Transitions: The Origin of Tetrapods (Video)

Disciplinary Core Ideas

•The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.
•Because of the conditions necessary for their preservation, not all types of organisms that existed in the past have left fossils that can be retrieved.

Heredity and Adaptation
TE: Investigation 1, Part 1, pp, 92-108
SE: *Fossil Dating,* pp 3-10, *Mass Extinctions,* pp. 73-77
DR: "Biodiversity," "Fossils"

Investigation 1, Part 2, pp. 114
SE: *An Interview with Jennifer Clack,* pp. 11-16; *Transitions,* pp. 78-81
DR: Fish with Fingers (Video), Great Transitions: The Origin of Tetrapods (Video)

Crosscutting Concepts

Patterns
Graphs and charts can be used to identify patterns in data.

Heredity and Adaptation
TE: Investigation 1, Part 1, pp, 92-108
SE: *Fossil Dating,* pp. 3-10, *Mass Extinctions,* pp. 73-77
DR: "Biodiversity," "Fossils"

Investigation 1, Part 2, pp. 114
SE: *An Interview with Jennifer Clack,* pp. 11-16; *Transitions,* pp. 78-81
DR: Fish with Fingers (Video), Great Transitions: The Origin of Tetrapods (Video)

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Scale, Proportion, and Quantity
Structure and Function

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.2

Students who demonstrate understanding can:
Apply scientific ideas to construct an explanation for the patterns of anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer ancestral relationships.

Clarification Statement: Emphasis is on explanations of the ancestral relationships among organisms in terms of similarities or differences of anatomical features or structures. Examples could include how structural similarities/differences could determine relationships between two modern organisms (i.e. wings of birds vs. bats vs. insects) or modern and fossil organisms (i.e. fossilized horses compared to modern horses, trilobites compared to horseshoe crabs).Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.

Heredity and Adaptation Course
Investigation 1, Part 2: response sheet

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Construct a scientific explanation based on valid and reliable evidence. ***Heredity and Adaptation*** **TE:** Investigation 1, Part 2, pp. 114-133 **SE:** *An Interview with Jennifer Clack,* pp. 11-16, *Transitions,* pp.78-81 **DR:** Fish with Fingers (Video), Great Transitions: The Origin of Tetrapods (Video)	•Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record serve as evidence of ancestral relationships among organisms and changes in populations over time. ***Heredity and Adaptation*** **TE:** Investigation 1, Part 2, pp. 114-133 **SE:** *An Interview with Jennifer Clack,* pp. 11-16, *Transitions,* pp.78-81 **DR:** Fish with Fingers (Video), Great Transitions: The Origin of Tetrapods (Video)	**Patterns** Graphs and charts can be used to identify patterns in data. ***Heredity and Adaptation*** **TE:** Investigation 1, Part 2, pp. 115-123

Additional Science and Engineering Practices Addressed

Asking Questions and Defining Problem
Planning and Carrying Out Investigations
Developing and Using Models
Analyzing and Interpreting Data
Developing and Using Models
Planning and Carrying Out Investigations
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Stability and Change
Scale, Proportion, and Quantity
Structure and Function

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.3

Students who demonstrate understanding can:
Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance in diagrams or pictures. Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.

Heredity and Adaptation Course
TE: Investigation 1, Part 2: notebook entry
Investigation 2, Part 1: notebook entry; Investigation 2 I-Check, #5

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze and interpret data to determine similarities and differences in findings. **Heredity and Adaptation** **TE**: Investigation 1, Part 2, pp.119-120 **DR**: Great Transitions: The Origin of Tetrapods (Video) (Pause at 4:59) Use Notebook Master No. 2 Investigation 2, Part 1, p. 173 Use Teacher Master T, *Dolphin Embryo Development*	•Comparison of embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. **Heredity and Adaptation** **TE**: Investigation 1, Part 2, pp.119-120 **DR**: Great Transitions: The Origin of Tetrapods (Video) (Pause at 4:59) Use Notebook Master No. 2 Investigation 2, Part 1, p. 173 Use Teacher Master T, *Dolphin Embryo Development*	**Patterns** Graphs and charts can be used to identify patterns in data. **Heredity and Adaptation** **TE**: Investigation 1, Part 2, pp.119-120 **DR**: Great Transitions: The Origin of Tetrapods (Video) (Pause at 4:59) Use Notebook Master No. 2 Investigation 2, Part 1, p. 173 Use Teacher Master T, *Dolphin Embryo Development*

Additional Science and Engineering Practices Addressed
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed
Scale, Proportion, and Quantity
Structure and Function

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.4

Students who demonstrate understanding can:

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations for why in a specific environment impacted by different factors (e.g., limited food availability, predators, nesting site availability, light availability), some traits confer advantages that make it more probable that an organism will be able to survive and reproduce there. Assessment Boundary: N/A

Heredity and Adaptation Course

Investigation 3, Part 1: notebook entry

Investigation 3, Part 2: response sheet; Investigation 3 I-Check

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Construct an explanation that includes qualitative or quantitative relationships between variables that predict and/or describe phenomena.

Heredity and Adaptation

TE: Investigation 3, Part 1, pp. 250-272
SE: Adaptation, pp. 41-52
DR: "Walking Sticks: Eat Insects"

Investigation 3, Part 2, pp. 278-284
SE: *Natural Selection,* pp. 53-59
DR: "Walking Sticks: Find Insects in Three Environments," "Larkey Natural Selection," The Making of the Fittest (Video), The Origin of the Species (Video)

Disciplinary Core Ideas

•Natural selection leads to the predominance of certain traits in a population, and the suppression of others.

Heredity and Adaptation

TE: Investigation 3, Part 2, pp. 278-284
SE: *Natural Selection,* pp. 53-59
DR: "Walking Sticks: Find Insects in Three Environments," "Larkey Natural Selection," The Making of the Fittest (Video), The Origin of the Species (Video)

Crosscutting Concepts

Cause and Effect
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Heredity and Adaptation

TE: Investigation 3, Part 1, pp. 251-256

Additional Science and Engineering Practices Addressed

Developing and Using Models
Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Using Mathematical and Computational Thinking
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.5

Students who demonstrate understanding can:
Gather and synthesize information about the practices that have changed the way humans influence the inheritance of desired traits in organisms.*

Clarification Statement :Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy);and on the impacts these practices have on society, as well as the technologies leading to these scientific discoveries. Assessment Boundary: The assessment should provide evidence of students' abilities to understand and communicate how technology affects both individuals and society.

Heredity and Adaptation Course
TE: Investigation 3, Part 3: performance assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Gather, read, synthesize information from multiple appropriate sources; assess the credibility, accuracy, and possible bias of each publication and methods used; and describe how they are supported or not supported by evidence. ***Heredity and Adaptation*** **TE:** Investigation 3, Part 3, pp. 301-306 **SE:** *Influencing Evolution,* pp. 84-88 **DR:** *"Genetic Technology Resources"*	•In artificial selections, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits by genes, which are then passed on to offspring. •Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. ***Heredity and Adaptation*** **TE:** Investigation 3, Part 3, pp. 301-306 **SE:** *Influencing Evolution,* pp. 84-88 **DR:** *"Genetic Technology Resources"*	**Cause and Effect** Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. ***Heredity and Adaptation*** **Cause and Effect** relationships will be part of the research information that students will share.

Additional Science and Engineering Practices Addressed

Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Systems and System Models

GRADE 8

Biological Unity and Diversity

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

Performance Expectation 8.LS4.6

Students who demonstrate understanding can:
Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time. Assessment Boundary: The assessment should provide evidence of students' abilities to explain trends in data for the number of individuals with specific traits changing over time. Assessment does not include Hardy Weinberg calculations.

Heredity and Adaptation Course
TE: Investigation 3, Part 2: response sheet

Science and Engineering Practices

Using Mathematical and Computational Thinking
Use mathematical representation to describe and/or support scientific conclusions and design solutions.

Heredity and Adaptation
TE: Investigation 3, Part 2, pp. 278-283
DR: "Walking Sticks: Find Insects in Three Environments," "Larkey Natural Selection," The Making of the Fittest (Video)

Disciplinary Core Ideas

•Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions.
•Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population change.

Heredity and Adaptation
TE: Investigation 3, Part 2, pp. 278-296
SE: *Natural Selection,* pp. 53-59
DR: "Walking Sticks: Find Insects in Three Environments," "Larkey Natural Selection," The Making of the Fittest (Video), Origin of the Species (Video), "Biodiversity"

Crosscutting Concepts

Cause and Effect
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Heredity and Adaptation
TE: Investigation 3, Part 2, pp. 279-281, 292-293
DR: The Making of the Fittest (Video), Origin of the Species (Video), "Biodiversity"

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Stability and Change
Systems and System Models

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Earth's Place in the Universe

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

Performance Expectation 8.ESS1.1

Students who demonstrate understanding can:
Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

Clarification Statement: Earth's rotation relative to the positions of the moon and sun describes the occurrence of tides; the revolution of Earth around the sun explains the annual cycle of the apparent movement of the constellations in the night sky; the moon's revolution around Earth explains the cycle of spring/neap tides and the occurrence of eclipses; and the moon's elliptical orbit mostly explains the occurrence of total and annular eclipses. The position and tilt of Earth, as it revolves around the sun, explain why seasons occur. Examples of models can be physical, graphical, or conceptual. Assessment Boundary: Definitions of spring or neap tides should not be included.

Planetary Science Course

Investigation 1, Part 3: performance assessment
Investigation 2, Part 1: performance assessment
Investigation 2, Part 2: response sheet
Investigation 2, Part 3: notebook entry
Investigation 3, Part 2: performance assessment
Investigation 4, Part 1: performance assessment
Investigation 4, Part 2: response sheet, notebook entry
Investigation 4, Part 3: notebook entry
Investigation 6, Part 2: performance assessment

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe a phenomenon.

Planetary Science
TE: Investigation 1, Part 3, pp. 145-150
DR: "US Naval Moon Phase Calendar," "Earth System Images"

Investigation 2, Part 1, pp. 173-183
DR: "Latitude and Longitude," "Day/Night"

Investigation 2, Part 2, pp. 187-194

Investigation 2, Part 3, pp. 200-222
SE: *Seasons on Earth,* pp. 15-21, *Eratoshenes: First to Measure Earth,* pp. 22-26, *Worldwide Sunrise/Sunset Data,* p. 131
DR: "Seasons"

Investigation 3, Part 2, pp. 254-260
SE: *Earth/Moon Comparison,* pp. 134

Investigation 4, Part 1, pp. 281-289
SE: *Moonrise/Sunrise Data,* p. 136
DR: "Moon Orientation," "Lunar Calendar"

Disciplinary Core Ideas

•Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.
•The model of the solar system can explain eclipses of the sun and the moon.
•Earth's spin axis is fixed in direction over the short term, but tilted relative to its orbit around the sun. The seasons are a result of its tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.

Planetary Science
TE: Investigation 1, Part 3, pp. 145-150
DR: "US Naval Moon Phase Calendar," "Earth System Images"

Investigation 2, Part 1, pp. 173-183
DR: "Latitude and Longitude," "Day/Night"

Investigation 2, Part 2, pp. 187-194

Investigation 2, Part 3, pp. 200-222
SE: *Seasons on Earth,* pp. 15-21, *Eratoshenes: First to Measure Earth,* pp. 22-26, *Worldwide Sunrise/Sunset Data,* p. 131
DR: "Seasons"

Crosscutting Concepts

Patterns
Patterns can be used to identify cause-and-effect relationships.

Planetary Science
Investigation 1, Part 3, pp. 145-150
DR: "US Naval Moon Phase Calendar," "Earth System Images"

Investigation 2, Part 1, pp. 173-183
DR: "Latitude and Longitude," "Day/Night"

Investigation 2, Part 2, pp. 187-194

Investigation 2, Part 3, pp. 200-222
SE: *Seasons on Earth,* pp. 15-21, *Eratoshenes: First to Measure Earth,* pp. 22-26, *Worldwide Sunrise/Sunset Data,* p. 131
DR: "Seasons"

Investigation 4, Part 1, pp. 281-289
SE: *Moonrise/Sunrise Data,* p. 136
DR: "Moon Orientation," "Lunar Calendar"

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

Investigation 4, Part 2, pp. 294-299 **SE:** *Phases of the Moon Sequence Puzzle,* p. 137 Investigation 4, Part 3, pp. 302-307 **SE:** *Earth's Moon,* pp. 42-48 **DR**: "Phases of the Moon," "Lunar Calendar" Investigation 6, Part 2, pp. 408-420 **SE:** *How Earth Got and Held onto Its Moon*, pp. 80-85 **DR:** "Tides"	Investigation 3, Part 2, pp. 254-260 **SE:** *Earth/Moon Comparison,* pp. 134	Investigation 4, Part 2, pp. 294-299 **SE:** *Phases of the Moon Sequence Puzzle,* p. 137 Investigation 4, Part 3, pp. 302-307 **SE:** *Earth's Moon,* pp. 42-48 **DR**: "Phases of the Moon," "Lunar Calendar"

Additional Science and Engineering Practices Addressed

Planning and Carrying Out Investigations
Asking Questions and Defining Problems
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Energy and Matter
Stability and Change
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity

GRADE 8

Earth's Place in the Universe

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

Performance Expectation 8.ESS1.2

Students who demonstrate understanding can:
Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

Clarification Statement: Emphasis for the model is on effects of gravity and inertia as the forces that hold together the solar system and Milky Way Galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as a school or state). Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.

Gravity and Kinetic Energy
Investigation 2, Part 2: notebook entry; Investigation 2 I-Check

Planetary Science Course
Investigation 6, Part 1: notebook entry
Investigation 6, Part 2: performance assessment, Investigations 5-6 I-Check
Investigation 7, Part 1: notebook entry

Science and Engineering Practices

Developing and Using Models
Develop and use a model to describe a phenomenon.

Planetary Science
TE: Investigation 6, Part 1, pp. 381-401
SE: *The Cosmos in a Nutshell*

Investigation 6, Part 2, pp. 404-422
SE: *How the Earth Got and Held onto Its Moon*
DR: "Solar System Origin Card Sort," "Origin of the Moon," Tides

Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites In the Solar System,* p. 135
DR: "Community Scale Model"

Disciplinary Core Ideas

•Earth and its solar system are part of the Milky Way Galaxy, which is one of the many galaxies in the universe.
•The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
•The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.

Planetary Science
TE: Investigation 6, Part 1, pp. 381-401
SE: *The Cosmos in a Nutshell*

Investigation 6, Part 2, pp. 404-422
SE: *How the Earth Got and Held onto Its Moon*
DR: "Solar System Origin Card Sort," "Origin of the Moon," Tides

Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites in the Solar System,* p. 135
DR: "Community Scale Model"

Crosscutting Concepts

Systems and System Models
Models can be used to represent systems and their interactions.

Planetary Science
TE: Investigation 6, Part 1, pp. 381-401
SE: *The Cosmos in a Nutshell*

Investigation 6, Part 2, pp. 404-422
SE: *How the Earth Got and Held onto Its Moon; Sun, Planets, and Satellites In the Solar System,* p. 135
DR: "Solar System Origin Card Sort," "Origin of the Moon," Tides

Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites in the Solar System,* p. 135
DR: "Community Scale Model"

Additional Science and Engineering Practices Addressed Planning and Carrying Out Investigations; Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Using Mathematical and Computational Thinking; Obtaining, Evaluating, and Communicating Information
Additional Crosscutting Concepts Addressed Patterns; Stability and Change; Cause and Effect; Scale, Proportion, and Quantity

TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

GRADE 8

Earth's Place in the Universe

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

Performance Expectation 8.ESS1.3

Students who demonstrate understanding can:
Analyze and interpret data to determine scale properties of objects in the solar system.*

Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models. Assessment Boundary: Assessment emphasis is on data analysis of properties of the planets and should not include recalling facts about the planets and other solar system bodies.

Planetary Science Course

Investigation 7, Part 1: notebook entry
Investigation 7, Part 2: notebook entry
Investigation 7, Part 3: notebook entry
Investigation 8, Part 1: notebook entry
Investigation 8, Part 2: performance assessment

Science and Engineering Practices

Analyzing and Interpreting Data
Analyze and interpret data to determine similarities and differences in findings.

Planetary Science
TE: Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites in the Solar System,* pp. 135
DR*:* "Community Scale Model"

Investigation 7, Part 2, pp. 453-459
DR: "Model of Jupiter's Atmosphere," "Exoplanet Archive," "Space Missions"

Investigation 7, Part 3, pp. 463-468
SE: *Landforms of the United States,* p. 145; *Earth Landforms, Satellite Images,* pp. 146-149*; Earth Landforms, Descriptions,* pp. 150-153; *Planet Landforms, Images,* pp. 154-159 Planet Landforms, Descriptions, pp. 160-163; *A Tour of the Solar System,* pp. 86- 96
DR: "Search for Water," "Solar System"

Investigation 8, Part 1, pp. 506-520
SE: *The Hunt for Water,* pp. 105-109
DR: "Properties of Light," "Comparing Spectra"

Investigation 8, Part 2, pp. 523-529
SE: *Space Missions,* pp. 167-179
DR: Hubble's Amazing Universe (Video)

Disciplinary Core Ideas

•The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
•Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.

Planetary Science
TE: Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites in the Solar System,* pp. 135
DR*:* "Community Scale Model" (Online Activity)

Investigation 7, Part 2, pp. 453-459
DR: "Model of Jupiter's Atmosphere" (Online Activity), "Exoplanet Archive" (Online Activity), "Space Missions" (Online Resource)

Investigation 7, Part 3, pp. 463-468
SE: *Landforms of the United States,* p. 145; *Earth Landforms, Satellite Images,* pp. 146-149*; Earth Landforms, Descriptions,* pp. 150-153; *Planet Landforms, Images,* pp. 154-159; Planet Landforms, Descriptions, pp. 160-163; *A Tour of the Solar System,* pp. 86-96
DR: "Search for Water," "Solar System"

Crosscutting Concepts

Scale, Proportion, and Quantity
Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

Planetary Science
TE: Investigation 7, Part 1, pp. 444-448
SE: *Sun, Planets, and Satellites in the solar System,* pp. 135
DR*:* "Community Scale Model" (Online Activity)

Investigation 7, Part 3, pp. 463-468
SE: *Landforms of the United States,* p. 145; *Earth Landforms, Satellite Images,* pp. 146-149*; Earth Landforms, Descriptions,* pp. 150-153; *Planet Landforms, Images,* pp. 154-159; Planet Landforms, Descriptions, pp. 160-163; *A Tour of the Solar System,* pp. 86-96
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TE: Teacher Editions-Investigations Guide, Teacher Resources • SE: Student Edition-Science Resources Book • DR: Digital Resources

	Investigation 8, Part 1, pp. 506-520 **SE:** *The Hunt for Water,* pp. 105-109 **DR:** "Properties of Light," "Comparing Spectra" Investigation 8, Part 2, pp. 523-529 **SE:** *Space Missions,* pp. 167-179 **DR:** Hubble's Amazing Universe (Video)	

Additional Science and Engineering Practices Addressed

Developing and Using Models
Asking Questions and Defining Problems
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematical and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Additional Crosscutting Concepts Addressed

Patterns
Energy and Matter
Cause and Effect
Systems and System Models