twig Science | NEXT GEN Grade 4 Scope and Sequence

MODULES	MODULE PHENOMENON	STORYLINE	PERFORMANCE EXPECTATIONS (*PEs that integrate traditional science content with engineering through SEPs or DCIs)
1: Egg Racers **NGSS Topic Arrangements: Energy; Engineering Design** 	What happens to energy when objects collide?	Crash! Bang! Wham! Students learn about collisions, impacts and safety when they design and build their own race cars with a little help from our cartoon friend, Egg. But can they design and build a car that is safe enough to crash without breaking the egg inside? To do that, students will first have to understand what happens to energy when objects collide, what kinetic energy is, and how shock absorption works.	**4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object. **4-PS3-3** Ask questions and predict outcomes about the changes in energy that occur when objects collide. **3–5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
2: Sparks Energy, Inc. **NGSS Topic Arrangements: Energy; Engineering Design** 	How do people produce and transfer energy for their use?	This is a newsflash! Sparks Energy, Inc. is recruiting intrepid reporters to investigate the energy needs of the United States and beyond. While working as science journalists, students learn about energy sources, discover how people use energy, and find out what impact this has on the environment. They work in teams to research the facts and figures, carry out investigations and interviews, and update their reports as new information comes in. The module ends with students using their knowledge and expertise to write an exclusive article for the Sparks Energy, Inc. website.	**4-ESS3-1** Obtain and combine information to explain that energy and fuels are derived from natural resources and their uses affect the environment. **4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. **4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* **3–5-ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3–5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3: Time-Traveling Tour Guides **NGSS Topic Arrangements: Earth's Systems** 	How have weathering and erosion sculpted some of Earth's most interesting landscapes?	What would you see if you traveled millions of years back in time? In this module, students become Time-Traveling Tour Guides and, with the help of videos and 360-degree imagery, discover how the Grand Canyon was formed. They observe fossils, investigate the effects of wind and water erosion on the landscape, use maps to look at patterns in the Earth's features, and study the course of the mighty Colorado River.	**4-ESS1-1** Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. **4-ESS2-1** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. **4-ESS2-2** Analyze and interpret data from maps to describe patterns of the Earth's features. **4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* **3–5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **3–5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
4: Earthquake Engineering **NGSS Topic Arrangements: Earth's Systems; Engineering Design** 	How can we reduce the damage caused by earthquakes?	Earthquakes can strike without warning, bringing massive destruction, but knowing where they happen can help reduce the damage caused. Students use an interactive to explore the Earth and investigate where earthquakes happen, collecting and analyzing data to identify patterns. Students find out what makes a strong and stable structure, and use this knowledge to design and build their own earthquake-proof buildings. Using an earthquake shake table, they test their structures and, like real civil engineers, refine their designs before the final build.	**4-PS4-1** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. **4-ESS2-2** Analyze and interpret data from maps to describe patterns of Earth's features. **4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* **3–5-ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3–5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **3–5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
5: Super Survivors **NGSS Topic Arrangements: Waves; Structure, Function, and Information Processing** 	How do the many parts of my body work together to help me live in the world? Communication involves transferring information through waves or signals.	Can you run as fast as a cheetah, hear as well as an Arctic fox, or see as far as a peregrine falcon? Through a series of videos, informational texts, and hands-on activities, students investigate the incredible world of plants and animals, and find out how they use their amazing structures and systems to survive. Building on their knowledge of information processing, students are then challenged to design a long-distance communication device. Can they use waves, digitization, and binary code to survive on a ship lost at sea?	**4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. **4-LS1-2** 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. **4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. **4-PS4-1** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. **4-PS4-2** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. **4-PS4-3** Generate and compare multiple solutions that use patterns to transfer information.* **3–5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **3–5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

ASSESSMENT All modules include: Pre-Exploration, Formative Assessment, Performance Task, Multiple Choice Assessment, and Benchmark Assessment

NGSS

Crosscutting Concepts
CCC-2 Cause and Effect
CCC-4 Systems and System Models
CCC-5 Energy and Matter

Disciplinary Core Ideas
PS3.A Definitions of Energy
PS3.B Conservation of Energy and Energy Transfer
PS3.C Relationship Between Energy and Forces

Engineering, Technology, and the Applications of Science
ETS1.A Defining Engineering Problems
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution

Science and Engineering Practices
SEP-1 Asking Questions and Defining Problems
SEP-2 Developing and Using Models
SEP-3 Planning and Carrying Out Investigations
SEP-4 Analyzing and Interpreting Data
SEP-6 Constructing Explanations and Designing Solutions
SEP-7 Engaging in Argument from Evidence
SEP-8 Obtaining, Evaluating, and Communicating Information

CROSS-CURRICULAR CONNECTIONS

Common Core English Language Arts
RI.4.1 Key Ideas and Details
SL.4.1 Comprehension and Collaboration
SL.4.4 Presentation of Knowledge and Ideas
W.4.2 Text Types and Purposes
W.4.8–9 Research to Build and Present Knowledge

WIDA English Language Development
Standard 1: Social and Instructional Language
Standard 2: The Language of Language Arts
Standard 3: The Language of Mathematics
Standard 4: The Language of Science

English Language Proficiency Domains
Speaking, Listening, Reading, Writing

Common Core Math
4.MD.A Solve problems involving measurement and conversion of measurements
MP6 Attend to precision

Crosscutting Concepts
CCC-2 Cause and Effect
CCC-4 Systems and System Models
CCC-5 Energy and Matter
CCC-6 Structure and Function

Disciplinary Core Ideas
PS3.A Definitions of Energy
PS3.B Conservation of Energy and Energy Transfer
PS3.D Energy in Chemical Processes and Everyday Life
ESS3.A Natural Resources

Engineering, Technology, and the Applications of Science
ETS1.A Defining Engineering Problems
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution

Science and Engineering Practices
SEP-1 Asking Questions and Defining Problems
SEP-2 Developing and Using Models
SEP-3 Planning and Carrying Out Investigations
SEP-4 Analyzing and Interpreting Data
SEP-5 Using Mathematics and Computational Thinking
SEP-6 Constructing Explanations and Designing Solutions
SEP-7 Engaging in Argument from Evidence
SEP-8 Obtaining, Evaluating, and Communicating Information

Environmental Principles and Concepts
Principle I People depend on natural systems
Principle II People influence natural systems
Principle IV There are no permanent or impermeable boundaries that prevent matter from flowing between systems
Principle V Decisions affecting resources and natural systems are complex and involve many factors

Common Core English Language Arts
L.4.4 Vocabulary Acquisition and Use
RI.4.1–3 Key Ideas and Details
RI.4.4, 5 Craft and Structure
RI.4.7, 8 Integration of Knowledge and Ideas
SL.4.1, 3 Comprehension and Collaboration
SL.4.5 Presentation of Knowledge and Ideas
W.4.2 Text Types and Purposes
W.4.4, 5 Production and Distribution of Writing
W.4.7, 9 Research to Build and Present Knowledge

WIDA English Language Development
Standard 1: Social and Instructional Language
Standard 2: The Language of Language Arts
Standard 3: The Language of Mathematics
Standard 4: The Language of Science

English Language Proficiency Domains
Speaking, Listening, Reading, Writing

Common Core Math
4.NBT.A Generalize place value understanding for multi-digit whole numbers
4.G.A Draw and identify lines and angles, and classify shapes by properties of their lines and angles
4.NF.B Build fractions from unit fractions
4.NF.C Understand decimal notation for fractions, and compare decimal fractions

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Crosscutting Concepts
CCC-1 Patterns
CCC-2 Cause and Effect
CCC-3 Scale, Proportion, and Quantity
CCC-4 Systems and System Models
CCC-7 Stability and Change

Disciplinary Core Ideas
ESS1.C The History of Planet Earth
ESS2.A Earth Materials and Systems
ESS2.E Biogeology
ESS3.B Natural Hazards

Engineering, Technology, and the Applications of Science
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution

Science and Engineering Practices
SEP-1 Asking Questions and Defining Problems
SEP-2 Developing and Using Models
SEP-3 Planning and Carrying Out Investigations
SEP-4 Analyzing and Interpreting Data
SEP-5 Using Mathematics and Computational Thinking
SEP-6 Constructing Explanations and Designing Solutions
SEP-8 Obtaining, Evaluating, and Communicating Information

Environmental Principles and Concepts
Principle III Natural systems change in ways that people benefit from and can influence
Principle V Decisions affecting resources and natural systems are complex and involve many factors

Common Core English Language Arts
L.4.4 Vocabulary Acquisition and Use
RI.4.1 Key Ideas and Details
RI.4.4, 5 Craft and Structure
RI.4.7–9 Integration of Knowledge and Ideas
SL.4.4, 5 Presentation of Knowledge and Ideas

WIDA English Language Development
Standard 1: Social and Instructional Language
Standard 2: The Language of Language Arts
Standard 3: The Language of Mathematics
Standard 4: The Language of Science

English Language Proficiency Domains
Speaking, Listening,

Common Core Math (continued)
4.MD.A Solve problems involving measurement and conversion of measurements
4.MD.B Represent and interpret data
4.MD.C Geometric measurement: understand concepts of angle and measure angles
4.NBT.A Generalize place value understanding for multi-digit whole numbers
4.NF.C Understand decimal notation for fractions, and compare decimal fractions
4.OA.A Use the four operations with whole numbers to solve problems

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Crosscutting Concepts
CCC-1 Patterns
CCC-2 Cause and Effect
CCC-4 Systems and System Models
CCC-5 Energy and Matter
CCC-6 Structure and Function

Disciplinary Core Ideas
PS4.A Wave Properties
ESS2.B Plate Tectonics and Large-Scale System Interactions
ESS3.B Natural Hazards

Engineering, Technology, and the Applications of Science
ETS1.A Defining Engineering Problems
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution

Science and Engineering Practices
SEP-1 Asking Questions and Defining Problems
SEP-2 Developing and Using Models
SEP-3 Planning and Carrying Out Investigations
SEP-4 Analyzing and Interpreting Data
SEP-6 Constructing Explanations and Designing Solutions
SEP-7 Engaging in Argument from Evidence
SEP-8 Obtaining, Evaluating, and Communicating Information

Environmental Principles and Concepts
Principle III Natural systems change in ways that people benefit from and can influence
Principle IV There are no permanent or impermeable boundaries that prevent matter from flowing between systems
Principle V Decisions affecting resources and natural systems are complex and involve many factors

Common Core English Language Arts
RI.4.1–3 Key Ideas and Details
RI.4.4 Craft and Structure
RI.4.7, 9 Integration of Knowledge and Ideas
SL.4.1–2 Comprehension and Collaboration
SL.4.4–6 Presentation of Knowledge and Ideas
W.4.2, 3 Text Types and Purposes
W.4.4 Production and Distribution of Writing
W.4.7–9 Research to Build and Present Knowledge
W.4.10 Range of Writing

WIDA English Language Development
Standard 1: Social and Instructional Language
Standard 2: The Language of Language Arts
Standard 3: The Language of Mathematics
Standard 4: The Language of Science

English Language Proficiency Domains
Speaking, Listening, Reading, Writing

Common Core Math
4.MD.A Solve problems involving measurement and conversion of measurements
4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic

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Crosscutting Concepts
CCC-1 Patterns
CCC-2 Cause and Effect
CCC-4 Systems and System Models
CCC-5 Energy and Matter
CCC-6 Structure and Function

Disciplinary Core Ideas
LS1.A Structure and Function
LS1.D Information Processing
PS3.A Definitions of Energy
PS3.B Conservation of Energy and Energy Transfer
PS4.A Wave Properties
PS4.B Electromagnetic Radiation
PS4.C Information Technologies and Instrumentation

Engineering, Technology, and the Applications of Science
ETS1.A Defining Engineering Problems
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution

Science and Engineering Practices
SEP-2 Developing and Using Models
SEP-3 Planning and Carrying Out Investigations
SEP-4 Analyzing and Interpreting Data
SEP-5 Using Mathematics and Computational Thinking
SEP-6 Constructing Explanations and Designing Solutions
SEP-7 Engaging in Argument from Evidence
SEP-8 Obtaining, Evaluating, and Communicating Information

Common Core English Language Arts
RI.4.1–3 Key Ideas and Details
RI.4.4, 5 Craft and Structure
RI.4.7–9 Integration of Knowledge and Ideas
RI.4.10 Range of Reading and Text Complexity
SL.4.1–3 Comprehension and Collaboration
SL.4.4, 5 Presentation of Knowledge and Ideas
W.4.2 Text Types and Purposes
W.4.4, 5 Production and Distribution of Writing
W.4.7, 9 Research to Build and Present Knowledge
W.4.10 Range of Writing

WIDA English Language Development
Standard 1: Social and Instructional Language
Standard 2: The Language of Language Arts
Standard 3: The Language of Mathematics
Standard 4: The Language of Science

English Language Proficiency Domains
Speaking, Listening, Reading, Writing

Common Core Math
4.G.A Draw and identify lines and angles, and classify shapes by properties of their lines and angles
4.MD.A Solve problems involving measurement and conversion of measurements
4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic

EGG RACERS

Performance Expectation Progressions

NGSS Topic Arrangements: Energy; Engineering Design

GRADE **4**
MODULE **1**

Egg Racers covers two NGSS Performance Expectations (PEs) in the Physical Sciences (4-PS3-1 and 4-PS3-3) and one in Engineering Design (3–5-ETS1-3). Together, these PEs introduce students to energy.

Students explore the abstract concept of energy, starting with a search for evidence of energy in their classroom. They build model cars and consider the forces involved in energy transfers, such as gravity, friction, pushes, and pulls.

Students explain the relationship between how much energy is transferred to an object and how quickly it moves. They also observe that, in a collision, energy can transfer to the air (e.g, producing sound).

PROGRESSION ►

PRIOR KNOWLEDGE		CURRENT GRADE	FUTURE KNOWLEDGE	
KINDERGARTEN	**GRADE 3**	**GRADE 4**	**GRADE 5**	**GRADE 6**
Module 2 K-PS2-1 K-PS2-2 **Marble Run Engineer** Students define a force as a push or a pull and learn that using a stronger push or pull causes an object to speed up or to slow down more quickly. Students discover that when objects touch or collide they can push each other, causing changes in direction and/or speed.	**Module 1** 3-PS2-1 **The Ultimate Playground** Students apply multiple forces to objects at one time, exploring balanced and unbalanced forces and how forces add up. Students also discover that gravity and magnets can push or pull without direct contact.	**Module 2** 4-PS3-2 4-PS3-4 **Sparks Energy, Inc.** Students explore how energy transfers can be put to practical use by humans. They learn about wind and water power, and understand that light is evidence of energy transfer. Students build electrical circuits, design a solar cooker to boil water, and build, test, and improve a wind turbine.	**Module 4** 5-PS2-1 **Galactic Guidebook** Students further explore gravity, developing visual models and written explanations to show that the Earth's gravitational force pulls everything to the center of the planet.	**Module 2** MS-PS3-4 MS-ESS2-4 MS-PS3-3 MS-PS3-5 **Destination Everywhere!** Students investigate energy (kinetic energy) in terms of particle motion. They model energy transfer in evaporation, condensation, transpiration, and the water cycle. Students explore thermal energy transfers. They collect and analyze data about how quickly different materials change temperature and design their own passive solar home.

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SPARKS ENERGY, INC.

Performance Expectation Progressions

NGSS Topic Arrangements: Energy; Engineering Design

GRADE **4**
MODULE **2**

Sparks Energy, Inc. covers two NGSS Performance Expectations (PEs) in the Physical Sciences (4-PS3-2 and 4-PS3-4), one in Earth and Space Sciences (4-ESS3-1), and two in Engineering Design (3–5-ETS1-1 and 3–5-ETS1-2.). Together, these PEs address how humans use energy transfers as well as natural resources for energy or fuel, and the impacts of this use.

Students investigate a variety of energy sources, evaluating their availability, usage, limitations, and renewability. They graph the production and use of energy sources in the United States and explore the environmental effects. Students analyze different solar cooker designs to boil water and engage in an engineering design challenge to build, test, and improve a wind turbine to convert energy of motion to electricity.

PROGRESSION			
PRIOR KNOWLEDGE	**CURRENT GRADE**	**FUTURE KNOWLEDGE**	
KINDERGARTEN	**GRADE 4**	**GRADE 5**	**GRADE 6**
Module 3 K-PS3-1 K-PS3-2 K–2-ETS1-1 K–2-ETS1-2 K–2-ETS1-3 **Be Prepared** Students start to explore energy transfer and the idea that sunlight warms the Earth's surface. Students develop ways to protect an area from the warming effects of the Sun. They design umbrellas and conduct tests to compare how well each material/design shades and cools the ground. **Module 4** K-ESS2-2 K-ESS3-3 **I Can** Students are introduced to relationships between humans and natural resources. They discover that living things use natural resources to survive and are introduced to the idea that humans can act to protect these resources.	**Module 1** 4-PS3-1 **Egg Racers** Students begin to explore the concept of energy. They hunt for evidence of energy in the classroom, build model cars, and consider the forces involved in energy transfers, such as gravity, friction, pushes, and pulls. They explain the relationship between how much energy is transferred to an object and how quickly it moves, they also observe that, in a collision, energy of motion can transfer to the air (e.g., produce sound).	**Module 2** 5-PS3-1 **Yellowstone: Uncovered** Students expand on their Grade 4 understanding of energy transfers and stored energy. They learn about chemical energy and model the flow of energy in an ecosystem. **Module 3** 5-ESS2-2 5-ESS3-1 **H2O Response Team** Students further investigate the relationship between humans and natural resources. They explore human impacts on fresh water resources, such as pollution, and efforts to protect the hydrosphere.	**Module 2** MS-PS3-3 MS-PS3-4 MS-PS3-5 MS-ESS2-4 MS-ETS1-1 MS-ETS1-3 **Destination Everywhere!** Students build on ideas about energy transfers within ecosystems, and model how energy transfers are involved in evaporation, condensation, and transpiration. They collect and analyze data about how quickly thermal energy transfers occur in different materials, and use this to design, refine, and evaluate their designs of passive solar homes. **Module 4** MS-ESS3-3 **Cities of the Future** Students revisit ways humans affect natural resources and systems. (e.g., biosphere, hydrosphere). They investigate impacts, such as pollution, deforestation, and climate change, and their effects on living organisms.

TIME-TRAVELING TOUR GUIDES

Performance Expectation Progressions

NGSS Topic Arrangements: Earth's Systems

GRADE **4**
MODULE **3**

Time-Traveling Tour Guides covers California NGSS Performance Expectations (PEs) in Earth Science (4-ESS1-1, 4-ESS2-1, 4-ESS2-2, and 4-ESS3-2) and two in Engineering Design (3–5-ETS1-2 and 3–5-ETS1-3).

Students revisit landforms, explored in Grade 2, and investigate erosion and weathering. They use stream trays to model the creation of real-life landforms along the Colorado River and the formation of the Grand Canyon. They observe time-lapse images of the Earth and identify changes to landscapes from natural processes and human development. Students design, build, test, and redesign an engineering solution to protect people and property from floods.

PROGRESSION				
PRIOR KNOWLEDGE			**CURRENT GRADE**	**FUTURE KNOWLEDGE**
KINDERGARTEN	**GRADE 2**	**GRADE 3**	**GRADE 4**	**GRADE 5**
Module 4 K-ESS2-2 **I Can** Students are introduced to the concept that Earth changes over time. They investigate how features in the environment are changed by plants, animals, and humans.	**Module 1** 2-ESS2-2 **My Journey West** Students investigate landforms. They learn to interpret geological features on maps. They create maps and explore ways maps can be used to convey different types of information. **Module 3** 2-ESS1-1 2-ESS2-1 K–2-ETS1-2 **Save the Island** Students build on the idea that plants and animals affect their environment. They explore other factors that shape and change the Earth: wind and water. Students investigate the effects of erosion and sea level rise on Tangier Island, Virginia, and explore how engineering can help protect people from natural processes and hazards.	**Module 4** 3-ESS3-1 3–5-ETS1-1 3–5-ETS1-2 **Weather Warning HQ** Students compare the relative effectiveness of different approaches to reducing the dangers from the natural hazards of lightning and wildfire.	**Module 4** 4-ESS2-2 4-ESS3-2 3–5-ETS1-1 3–5-ETS1-2 3–5-ETS1-3 **Earthquake Engineering** Students use maps to discover patterns in the locations of Earth's features. They analyze data to connect patterns in the locations of earthquakes and geological features. They explore how different shapes and materials respond to earthquake effects and use that knowledge to design, build, and test their own earthquake-proof structures.	**Module 3** 5-ESS2-1 **H2O Response Team** Building on their Grade 4 ideas about how water and wind affect Earth, students investigate Earth systems and the ways they interact. They explore geosphere-hydrosphere interactions, such as that landforms (e.g., mountains) can affect a region's weather and climate, and that ocean waves can erode coastlines.

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EARTHQUAKE ENGINEERING

Performance Expectation Progressions

NGSS Topic Arrangements: Earth's Systems; Engineering Design

GRADE **4**
MODULE **4**

Earthquake Engineering introduces one NGSS Performance Expectation (PE) in Physical Sciences (4-PS4-1) and explores two in Earth Sciences (4-ESS2-2 and 4-ESS3-2). These PEs address waves, natural hazards, and the mapping of Earth's features and forces.

Three additional PEs engage students in engineering design: 3–5-ETS1-1, 3–5-ETS1-2, and 3–5-ETS1-3. While aspects of engineering design are addressed in other Grade 4 modules, Earthquake Engineering emphasizes designing structures to solve problems that arise from natural hazards.

PROGRESSION					
PRIOR KNOWLEDGE				CURRENT GRADE	FUTURE KNOWLEDGE
KINDERGARTEN	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 6
Module 2 K-PS2-2 K–2-ETS1-1 **Marble Run Engineer** Students define a force as a push or a pull. They discover that using a stronger push or pull causes an object to speed up or slow down more quickly, and that when objects touch or collide they can push each other, causing changes in direction and/or speed. **Module 3** K-ESS3-2 K–2-ETS1-2 **Be Prepared** Students are introduced to the idea that natural processes can affect humans. They read about natural hazards posed by different forms of severe weather. They ask questions to understand and prepare for a severe weather scenario. They design umbrellas, exploring the connection between choice of materials and specific weather conditions.	**Module 2** 1-PS4-1 **Animal Reporters** Students develop an introductory understanding of sound waves. They investigate everyday objects to produce sounds. They discover that sounds cause objects to move and that all sounds are caused by vibrations.	**Module 1** 2-ESS2-2 **My Journey West** Students learn to interpret geological features on maps. They create maps and explore ways that maps can be used to convey different types of information. **Module 2** 2-PS1-2 K–2-ETS1-3 **Master of Materials** Students build and test the strength of model towers made of different materials. **Module 3** K–2-ETS1-1 **Save the Island** Students explore the effects of erosion and sea-level rise on Tangier Island. They define design criteria to address these problems. Students learn about engineering solutions and evaluate each against their design criteria.	**Module 4** 3-ESS3-1 3–5-ETS1-1 3–5-ETS1-2 **Weather Warning HQ** Students investigate natural hazards from severe weather. They explore the relationship between storms and lightning, and between lightning and hazards such as wildfires. They compare the relative effectiveness of different approaches to reducing hazards and to educating people about them.	**Module 5** 4-PS4-1 **Super Survivors** Students investigate waves in water and sound waves. They model wave motion, exploring patterns of wave amplitude and wavelength. They discover how waves in water transfer energy. They compare the effect of waves on objects in the open ocean versus objects near shore.	**Module 2** MS-ESS2-5 MS-ESS2-6 **Destination Everywhere!** Students explore the causes of weather and regional climates. They look for patterns on an interactive map and identify possible relationships between weather, climate, and geology.

SUPER SURVIVORS

Performance Expectation Progressions

NGSS Topic Arrangements: Waves; Structure, Function, and Information Processing

GRADE **4**
MODULE **5**

Super Survivors covers two NGSS Performance Expectations (PEs) in Life Sciences (4-LS1-1 and 4-LS1-2), four in the Physical Sciences (4-PS3-2, 4-PS4-1, 4-PS4-2, and 4-PS4-3), and two in Engineering Design (3–5-ETS1-2 and 3–5-ETS1-3).

Students revisit ideas from Grades 1 and 2 about external plant and animal parts. They model how internal and external parts work together for animal and plant processes. They discover the role of the brain in perceiving, responding to, and recalling information taken in through the senses.

Students investigate the role of light in sight, and reexamine ideas from Grade 1 about waves and sound. They model wave motion, exploring patterns of wave amplitude and wavelength. They also discover that energy can be transferred by waves, including sound.

The Engineering Design Challenge builds on one from Grade 1, where students made communication tools using sound waves. Here, students explore ancient and modern communication techniques and design possible solutions for sending a coded message over a distance.

PROGRESSION

PRIOR KNOWLEDGE			CURRENT GRADE	FUTURE KNOWLEDGE
KINDERGARTEN	**GRADE 1**	**GRADE 2**	**GRADE 4**	**GRADE 6**
Module 1 K-LS1-1 **My Big Nature Adventure** Students are introduced to animals, identifying that animals have needs to survive, such as food and water. They define *living* and *non-living*.	**Module 1** 1-LS1-1 **Museum of Leafology** Students revisit living and non-living things, and the needs of plants. They identify external plant parts and connect them to their roles in meeting a plant's survival needs. They explore ways that shape, size, and other features relate to the functions of a plant's part. **Module 2** 1-LS1-2 1-PS4-1 1-PS4-4 K–2-ETS1-1 K–2-ETS1-2 K–2-ETS1-3 **Animal Reporters** Students investigate animals' external body parts and chart different ways they are used (e.g., to move, for protection, to take in information), focusing on ties between structure and function. Students also develop an introductory understanding of waves. They investigate everyday objects to produce sounds, and discover that all sounds are caused by vibrations. They engineer a communication device to send a message, evaluating and modifying their designs to ensure the sound can be heard from a distance. **Module 3** 1-PS4-3 **Shadow Town** Students investigate objects in boxes and darkened spaces, varying the amount of light. They discover that light moves in a straight line, that objects can only be seen when there is light to illuminate them, and that some materials reflect light.	**Module 4** 2-LS2-2 **A Garden for Life** Students learn more about the structure and function of external plant and animal parts. They observe the parts of plants and animals that depend on each other for survival needs (e.g., flowering plants and pollinators). They identify connections between the structure of the parts in each of the interdependent organisms.	**Module 4** 4-PS4-1 **Earthquake Engineering** Students explore waves to better understand the effects of earthquakes. They model wave motion in water and with a rope, defining amplitude (wave height) and wavelength (distance between wave peaks). They connect the amplitude of seismic waves to the amount of energy the waves transfer.	**Module 1** MS-LS1-1 MS-LS1-2 MS-LS1-3 MS-LS1-8 **BioTech Systems Worldwide** Students build on ideas from previous grades about the relationship between structure and function. They review the term *systems* and further explore how sensory receptors and the brain function together to respond to and remember information. They use evidence to support an argument about the claim that the body is a system of interacting subsystems composed of groups of cells.