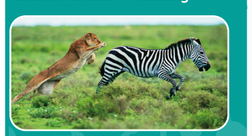
twig SCIENCE Grade 4 Scope and Sequence

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

MODULES	MODULE ANCHOR PHENOMENON	STORYLINE	PERFORMANCE EXPECTATIONS (*PEs that integrate traditional science content with engineering through SEPs or DCIs)	NGSS		CROSS-CURRICULAR CONNECTIONS	
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.	**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	**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
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.	**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
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.	**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** **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
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.	**Crosscutting Concepts** **CCC-1** Patterns **CCC-2** Cause and Effect **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
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.	**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