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|  | 2019-2020  Elementary Science  Quick Guide  Grade 4 |

<http://elementary.dmschools.org>

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Grade 4: Year at a Glance

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| **Aug-Oct** | | **Oct-Jan** | | **Jan-March** | | **March-May** | |
| **Unit 1** | **Unit 2** | **Unit 3** | **Unit 4** | **Unit 5** | **Unit 6** | **Unit 7** | **Unit 8** |
| **Science** | **Science** | **Science** | **Science** | **SS** | **SS** | **SS** | **SS** |
| **EL Module 1: Poetry, Poets, and Becoming Writers** | | **EL Module 2: Animal Defense Mechanisms** | | **EL Module 3: The American Revolution** | | **EL Module 4: Responding to Inequality: Ratifying the 19th Amendment** | |
| Transfer of Energy,  Energy in Motion, Waves,  Energy Resources in the Environment | | Plants and Animal Systems,  Energy Resources in the Environment  **** | Earth's Changing Surface,  Natural Hazards | Revolution  **** | Regions of the US | Innovation and Technology | Changing Rights  **** |

** = STRONG alignment to EL materials**

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| FOSS Kits  Topic Scales | **Soils Rocks and Landforms Foss Kit** | **Energy Foss kit** | **Environments Foss Kit** |
| **Earth’s Changing Surface** | Investigations 1, 3, and 4 |  |  |
| **Natural Hazards** | Investigations 2 and 3 |  |  |
| **Transfer of Energy** |  | Investigation 1, 2, and 3 |  |
| **Energy in Motion** |  | Investigation 4 |  |
| **Waves** |  | Investigation 5 |  |
| **Plant and Animal Systems** |  |  | Investigation 1, 2, |
| **Energy Resources in the Environment** |  | Investigation 5 | Investigation 3 |

Below you will find a list resources to support the DMPS Science scales for your grade level. Each includes the scale (state standards) to be addressed.

The scale should always be your starting point for deciding what you will be offering for a learning experience. Think “what will I see students doing to show me they “get" this standard?” As a reminder the standards are written as “performance expectations” and include a Science Practice, a Core Idea, and a Crosscutting Concept, so it should be something the student does (is engaged in) and not merely a recall of information.

Below the scale is a “Big idea” statement to try to capture the essence of the scale. If this does not help you stick with the scale. The scale is the expected learning.

After the big idea you will find the specific FOSS materials that should give you a chance to capture evidence of the scale. FOSS is a very comprehensive program and it would be very challenging to do all parts of all of the investigations. That said, keep the scale in mind “which parts will best help my students learn this scale?”

The listed FOSS items in this guide have a tight alignment to the scale but you will need to know where your students are and what Investigations will best help them learn the scale. It may be necessary to build some additional knowledge by doing additional investigations and parts. You as the teacher always have the freedom to do this. The goal of this document is to help you more quickly identify the elements in FOSS that tightly align to the scale. You have the power and responsibility to add and subtract to best meet the needs of your students.

We have also included links to Heartland AEA resources (all are free) that align with the scale being taught.

First is a link to “[Mystery Science](https://mysteryscience.com/start?code=3728dj2s&allow_skip=true)” this is a fairly comprehensive program built to support the new standards and can provide a number of ways and ideas to help engage your students in the scale. [To login you will need to set up an account with your DMPS email and select your building.](https://mysteryscience.com/start?code=3728dj2s&allow_skip=true)

Next listed is a link to “[Pebble Go](https://www.pebblego.com/)”. This is a resource to help support access for those that are early or struggling readers. Finally for grades 3-5 is [Discovery Education](http://www.discoveryeducation.com/) a bank of resources around the scale content materials. To access these or any other AEA resources you will need to use your DMPS login (username 1737----- and password haea11), if you do not know your building username we can help you.

The final link is to the list of [Heartland online resources](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) in general that you may find helpful (True Flix, Book Flix, netTrekker, etc.)

**4th Grade Science**

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| Earths Changing Surface  SEP- Plan and Carryout Investigations, Constructing Explanations, Analyze Data DCI- Earths Place in the Universe, Earth Systems CCC- Cause and effect, Patterns | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. | |
| 3  Learning Goal | Students will:   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 ESS1-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 2. 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 ESS2-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS2-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 3. Analyze and interpret data from maps to describe patterns of Earth’s features. ([4 ESS2-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS2-2%20Evidence%20Statements%20June%202015%20asterisks.pdf)) | |
| 2 | Students will:   1. 1. Identify evidence to indicate a local/regional rock layer or fossil pattern.   2. Use given rock layers or fossil patterns to explain past and present earth features and climate.   1. 1. Identify data to be collected, observations, and measurements to be made when given an investigation related to weathering and erosion.   2. Record observations to provide evidence for the effects of weathering or the rate of erosion on Earth materials.  3. Describe the cause/effect relationship between the rate of weathering and erosion and their impact on landforms   1. 1. Organize data from maps on Earth’s features in to tables, charts, or graphs   2. Identify patterns from Earth features based on locations (mountains, earthquake activity, oceans, etc.)  3. Organize and make sense of Earth feature patterns that reflect how they formed or occurred.  Students will recognize or recall specific vocabulary, such as:  Patterns, fossil, rock layer, erosion, weathering, model, chemical reaction, topographic map, elevation, | |
| 1 | Student’s learning reflects insufficient progress towards foundational skills and knowledge. | |

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| **Earths Changing Surface** | |
| **“Big Idea”**  **Through investigations students will make observations that will support a claim for how changes in landscape occur overtime, evidence of erosion from weathering, through interpretations of maps and data describe patterns in earth features.** | |
| FOSS Soils Rocks and Landforms | Additional Resources |
| Investigation 1 Teacher Guide pg 95  Part 2 Physical Weathering and 3 Chemical Weathering  Investigation 2 Teacher Guide pg 159  Part 1 Erosion and Deposition, 2 Stream table, 3 Schoolyard erosion, 4 Fossil Evidence  Investigation 3 Teacher Guide pg 219  Part 1 Topographic Map and 2 Drawing a Profile | [Mystery Science Birth of Rocks Mystery’s 1-3](file:///Users/rkleinow/Downloads/Mystery%20Science%20%20%20%20%20Pebble%20Go%20%20%20%20Discovery%20Education)  [Pebble Go-Earth Science](https://www.pebblego.com/modules/2/categories/2993)  [Discovery Education Earths Changing Surface](https://app.discoveryeducation.com/scienceelementary/concept?id=Earth&guid=892F07BF-7688-4113-9247-6DCAE1723FF0#INTRO%2C4%2C892F07BF-7688-4113-9247-6DCAE1723FF0%2C7EE647F9-E84D-4AC3-8C22-D0521DB5D771%2Cfalse)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Natural Hazards  SEP- Construct an Explanation DCI-, Earth Systems CCC- Cause and effect | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.\* ([4 ESS3-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS3-2%20Evidence%20Statements%20June%202015%20asterisks.pdf))([3-5-ETS1-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-5-ETS1-2%20Evidence%20Statements%20June%202015%20asterisks-5.pdf)) |
| 2 | Students will:   1. 1. Describe a solution to reduce a negative effect of an Earth process on humans.   2. Describe the criteria and constraints for a design solution that reduces the impact of Earth processes on humans.  3. Rate the effectiveness of a design solution for an Earth process problem within the defined criteria and constraints.  4. Describe the design solutions in terms of how each alters the effect of the Earth process on humans.  Students will recognize or recall specific vocabulary, such as:  Natural Hazards, Impact, volcano, earthquake, landslide, lava, magma |
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| **Natural Hazards** | |
| **“Big Idea”**  **Generate and evaluate solutions to reduce impact of humans on natural processes.** | |
| FOSS Soils Rocks and Landforms | Additional Resources |
| Investigation 2 Teacher Guide pg 171  Part 2 Stream Table and 3 School yard erosion  Investigation 3 Teacher Guide 251  Part 4 Rapid Changes | [Mystery Science Birth of Rocks Mystery 4](file:///Users/rkleinow/Downloads/Mystery%20Science%20Birth%20of%20Rocks%20Mystery’s%201-3)  [Pebble Go-Earth Science](https://www.pebblego.com/modules/2/categories/2993)  [Discovery Education Glaciers Volcanos Earthquakes](https://app.discoveryeducation.com/scienceelementary/concept?id=Earth&guid=892F07BF-7688-4113-9247-6DCAE1723FF0#INTRO%2C4%2C892F07BF-7688-4113-9247-6DCAE1723FF0%2C7EE647F9-E84D-4AC3-8C22-D0521DB5D771%2Cfalse)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Transfer of Energy  SEP- Plan and conduct an investigation, Constructing Explanations DCI- Energy CCC- Energy and Matter | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. ([4 PS3-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS3-2%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 2. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.\* ([4 PS 3-4](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS3-4%20Evidence%20Statements%20June%202015%20asterisks.pdf))([3-5-ETS1-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-5-ETS1-2%20Evidence%20Statements%20June%202015%20asterisks-5.pdf)) |
| 2 | Students will:   1. 1. Describe a situation where they believe energy is being transferred.   2. Describe how the investigation design will provide evidence of energy transfer  3. Describe the data to be collected and how it will be measured in the energy transfer investigation.  4. Collect data from an investigation to provide evidence that energy has been transferred.   1. 1. Collaboratively design an energy conversion solution to a given problem.   2. Specify the initial and final forms of energy and the device by which the energy is transformed.  2. Describe the solution criteria and constraints (including safety) for an energy transfer problem solution.  3. Rate the effectiveness of the proposed solutions based on how well it meets the criteria and constraints of the problem.  Students will recognize or recall specific vocabulary, such as:  Energy, Force, Magnetism, Electricity, circuit, Energy Transfer, Pole |
| 1 | Student’s performance reflects insufficient progress towards foundational skills and knowledge. |

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| **Transfer of Energy** | |
| **“Big Idea”**  **Observe that energy can be transferred and apply that knowledge to design, test, or refine a device that can convert one form of energy into another.** | |
| FOSS Energy | Additional Resources |
| Investigation 1 Teacher Guide 115  Part 1, 2  Investigation 5 Teacher Guide pg 373  Part 3 | [Mystery Science Energize Everything](https://mysteryscience.com/energy/energy-motion) Mystery 1, 4, 5, 6  [Discovery Education About Energy](https://app.discoveryeducation.com/scienceelementary/concept?id=Physical&guid=41DB0823-DD49-4474-BFBF-0029AB952FE63)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Energy in Motion  SEP- Constructing Explanations, Asking Questions DCI- Energy CCC- Energy and Matter | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. ([4 PS 3-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS3-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 2. Ask questions and predict outcomes about the changes in energy that occur when objects collide. ([4 PS3-3](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS3-3%20Evidence%20Statements%20June%202015%20asterisks.pdf)) |
| 2 | Students will:   1. 1. Relate that the speed of an object to the energy of the object.   2. Describe the indicators of the amount of energy of an object possesses.  3. Identify energy transfer between objects.   1. 1. Ask relevant questions regarding the mechanisms involved in an energy transfer.   2. Make reasonable predictions about energy changes after objects collide.  3. Ask questions that can be tested relating to energy transfer within the scope of the school setting.  Students will recognize or recall specific vocabulary, such as:  Collide, Collision, Friction, Fuel, Heat, Kinetic Energy, Potential Energy, Energy transfer, Speed, |
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| **Energy in Motion** | |
| **“Big Idea”**  **Use evidence to develop an explanation showing the relationship of the speed of an object to its energy. Use knowledge of energy to predict the energy changes that will occur during a collision.** | |
| FOSS Energy | Additional Resources |
| Investigation 4 Teacher Guide pg 289  Part 1 Presence of Energy  Part 2 Rolling Balls down slopes  Part 3 Collisions | [Mystery Science Energize Everything](https://mysteryscience.com/energy/energy-motion) Mystery 2 and 3  [Discovery Education Changing Energy](https://app.discoveryeducation.com/scienceelementary/concept?id=Physical&guid=41DB0823-DD49-4474-BFBF-0029AB952FE63#INTRO%2C4%2C41DB0823-DD49-4474-BFBF-0029AB952FE63%2C87E0096A-6DA7-4822-BFF7-DD4B890AD5B2%2Cfalse)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Waves  SEP- Designing Solutions, Developing and Using Models DCI- Energy CCC- Energy and Matter, Patterns, Cause effect | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. ([4 PS4-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS4-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. ([4 PS 4-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS4-2%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 3. Generate and compare multiple solutions that use patterns to transfer information.\* ([4 PS4-3](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-PS4-3%20Evidence%20Statements%20June%202015%20asterisks.pdf))([3-5-ETS1-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-5-ETS1-2%20Evidence%20Statements%20June%202015%20asterisks-5.pdf)) |
| 2 | Students will:     1. 1. Identify wave features: waves, wave amplitude, wavelength, and motion of objects.   2. Use a model to describe the relative relationships of wave components and patterns.  3. Use patterns to describe simple relationships involving wave amplitude, wavelength, and the motion of an object.   1. 1. Identify the relevant components of a model for vision. (light, object, the path of light, eye)   2. Use a model to describe the effects on “seeing” when: light is removed, eyes are closed, or light path is altered.  3. Describe the how light enables our vision.   1. 1. Describe a design solution using patterns to transmit information.   2. List criteria for a design solution including the accuracy of transmitted information.  3. Rate a design solution based on a set of criteria  Students will recognize or recall specific vocabulary, such as:  Amplitude, Compression, Cycle, Frequency, Peak, Reflect, Refract, Trough, Wave, Wavelength |
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| **Waves** | |
| **“Big Idea”**  **Develop a model to show thinking how the pattern produced by waves can cause objects to move. Also how the reflection of light allows objects to be seen. Use the knowledge of waves movement and patterns to make and compare solutions to transferring information.** | |
| FOSS Energy | Additional Resources |
| Investigation 5 Teacher Guide pg 343  Part 1 Forms of Waves  Part 2 Light Travel  Part 3 Engineering with Solar Cells | [Mystery Science Waves of Sound](https://mysteryscience.com/waves/sound-waves-communication)  [Pebble Go Light and Sound](https://www.pebblego.com/modules/2/categories/2998)  [Discovery Education Sound](https://app.discoveryeducation.com/scienceelementary/concept?id=Physical&guid=32AEB312-2E02-4A17-961A-7FA4BD9362A7#INTRO%2C4%2C32AEB312-2E02-4A17-961A-7FA4BD9362A7%2C6F1CB4B1-0FA7-4544-A0F4-D98D6755BDCC%2Cfalse)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Plant and Animal Systems  SEP- Engaging in Argument from Evidence, Models DCI- Molecules to Organisms CCC- Systems and System Models | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. ([4 LS1-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-LS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) 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 LS 1-2](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-LS1-2%20Evidence%20Statements%20June%202015%20asterisks.pdf)) |
| 2 | Students will:   1. 1. Identify internal and external structures of a living system helping them survive.   2. List internal and external structures and their primary function.  3. Describe how internal and external structures function as a system to aid plants or animals in survival and reproduction.   1. 1. Given a model identify relevant components of how a living organism gains information about its surroundings.   2. Describe the relationships between sense receptors and an organism’s ability to interact with its environment.  3. Use a model to better understand the sensory-environment interaction.    Students will recognize or recall specific vocabulary, such as:  System, internal, external, living system, structure, function, life cycle, environment |
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| **Plant and Animal Systems** | |
| **“Big Idea”**  **Be able to argue how the structure and function of plant and animal parts help them survive and through models explain how animals(like humans) use senses to gather information and then respond.** | |
| FOSS Environments | Additional Resources |
| Investigation 1 Teacher Guide pg 93  Part 1 Observing Mealworms  Investigation 2 Teacher Guide pg 203  Part 4 Sound off  Investigation 3 Teacher Guide pg 233  Part 1 Setting up the experiment  Investigation 4 Teacher Guide pg 293  Part 1 Water and Salt Tolerance | [Mystery Science Human Machine](https://mysteryscience.com/body/body-senses-the-brain)  [Pebble Go Senses](https://www.pebblego.com/modules/2/categories/2950)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |

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| Energy Resources in the Environment  SEP- Obtaining Information DCI- Natural Resources CCC- Cause and Effect | |
| 4 | The student demonstrates in-depth inferences and applications that go beyond the goal. |
| 3  Learning Goal | Students will:   1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. ([4 ESS 3-1](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS3-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)) |
| 2 | Students will:   1. 1. Gather reliable information from books or media about energy resources and fossil fuels.   2. Use information to describe the impact of the energy resources on the environment, its sustainability, and ways negative impacts can be reduced.  3. Describe the role of technology in extracting and using an energy resource  Students will recognize or recall specific vocabulary, such as:  Natural Resource, Effect, Environment, Fossil Fuel, Sustainability, Solar, Wind, Water, Nuclear |
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| **Energy Resources in the Environment** | |
| **“Big Idea”**  **Effectively communicate how we use natural resources for energy and the environmental impact that may cause.** | |
| FOSS Energy/Soil Rock and Landforms | Additional Resources |
| Investigation 5(energy) Teacher Guide 373  Part 3 Engineering with Solar Cells  Investigation 4 Teacher Guide pg 275  part 1 Introduction to Natural Resources | [Pebble Go Natural Resources](https://www.pebblego.com/modules/2/categories/2949)  [Discovery Education Natural Resources](https://app.discoveryeducation.com/scienceelementary/concept?id=Earth&guid=5B43C9B7-5DB7-4923-8B5E-FE0BF99FEAF7)  [Heartland AEA](http://www.heartlandaea.org/library-and-digital-resources/online-resources/k-5th-grade/) |