Science-Grade 4

Unit Title: Grade 4 - Unit 1: Structures and Functions

How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction?

In this unit of study, students develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. The crosscutting concepts of systems and system models are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in engaging in argument from evidence. Students are also expected to use this practice to demonstrate understanding of the core idea.
This unit is based on 4-LS1-1.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Engaging in Argument from Evidence
      - Construct an argument with evidence, data, and/or a model. (4-LS1-1)
  - **Disciplinary Core Ideas (DCI)**
    - LS1.A: Structure and Function
      - Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4LS1-1)
  - **Crosscutting Concepts (CCC)**
    - Systems and System Models
      - A system can be described in terms of its components and their interactions. (4-LS1-1)

Central Idea / Enduring Understanding:

In this unit of study, students develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. The crosscutting concepts of *systems and system models* are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency *in engaging in argument from evidence*. Students are also expected to use this practice to demonstrate understanding of the core idea.

Essential/Guiding Question:

- How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction?

Content:

- A system can be described in terms of its components and their interactions.
- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Skills (Student Learning Objectives):

- 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.] (4-LS1-1)

Stage 2: Assessment Evidence

Performance Task(s):	Other Evidence:
● "Inquiry labs" ● STEM activities ● Formative assessment: "Lesson Check" blackline masters ● "Got It?" self-assessments in each lesson ● Complete graphic organizers ● Performance Expectation Activity	● Post-activity discussion questions ● Review Vocabulary Smart Cards ● Students elaborate in "Science Notebooks" ● Students make connections to the "Unlock the Big ?" in each lesson. ● Have students restate or contrast topics in each lesson

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - 4.G.A.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
- **NJSLS – English Language Arts**
  - W.AW.4.1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills**
  - 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
  - 9.1.5.RMI.1:Identify risks that individuals and households face.
  - 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certifications.
  - 9.4.5CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.
  - 9.4.5.CI.4: Research the development process of a product and identify the role of failure as part of the creative process.
  - 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
  - 9.4.5.IML.3: Create a visual representations to organize information about a problem or issue.

Stage 3: Learning Plan

Learning Opportunities/Strategies:	Resources:
Pearson Chapter 4 ● **Inquiry:** Students will classify flower parts based on similarities and differences.	**Pearson Chapter 4** ● **Try It:** How can flower parts be classified? SE/TE p. 114

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Pearson Chapter 4 Lesson 1 ● **Engage:** Have students identify differences between a plant and an animal. ● **Explore:** What are some ways you can classify animals? ● **Explain:** Have students read Classifying Organisms, Classifying Plants, and Classifying Animals and answer the questions ● **Elaborate:** Science Notebook: Have students write the meaning of vascular and and some related words in their Science Notebook ● **Evaluate:** Formative Assessment	**Pearson Chapter 4 Lesson 1** ● **Envision It!** SE pp. 163-168 ● **Explore it!** SE p. 120 blackline master TE p. 125a ● **Explain:** SE pp. 121-127 ● **Elaborate:** TE p. 122 ● **Evaluate**: TE p. 127b Got It: SE p. 127
Pearson Chapter 4 Lesson 2 ● **Engage:** Have students think about what will happen when some seeds blow away. ● **Explore:** My Planet Diary ● **Explain:** Have students read Plants that Make Seeds...and answer questions. ● **Elaborate:** Have students research imperfect flowers and draw diagrams of imperfect flowers they research, showing either male or female parts. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment	**Pearson Chapter 4 Lesson 2** ● **Envision It!** SE pp. 128-129 ● **Explore It!** SE pp. 128 blackline master TE 135a ● **Explain:** SE pp. 129-135 ● **Elaborate:** TE p. 130 ● **Evaluate:** SE pp. 163-168 TE p. 135b
Pearson Chapter 4 Lesson 3 ● **Engage:** Have students identify various plant parts. ● **Explore:** How can plants react to light? ● **Explain:** Have students read Needs of Plants answer questions ● **Elaborate:** Students discuss how the sharp, thin needles of a cactus help it to survive in the desert. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment	**Pearson Chapter 4 Lesson 3** ● **Evision It!:** SE pp. 136-137 ● **Explore It!:** SE p. 136, blackline master TE p. 141a ● **Explain:** SE pp. 137-141 ● **Elaborate**: TE p. 140 ● **Evaluate:** SE pp. 163-168 TE p. 141b
Pearson Chapter 4 Lesson 4 ● **Engage:** Have students identify how each bird's feet help it survive.	**Pearson Chapter 4 Lesson 4** ● **Envision It!: SE** pp. 142-143

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• **Explore:** How can some fish float? • **Explain:** Have students read Adaptations, Animal adaptations, and plant adaptations and answer questions. • **Elaborate:** Science Notebook: Students will analyze pictures of leaves, stems, and seeds and write a caption about how each is an adaptation that helps the plants survive. • **Evaluate:** Vocabulary Smart Cards Formative Assessment **<u>Additional learning opportunities/strategies:</u>** • Performance Expectation Activity: Research an internal or external plant or animal structure and explain the role of that structure in the organism's life. • Websites	• **Explore It!:** SE p. 142, blackline master TE p. 147a • **Explain:** SE pp. 143-147 • **Elaborate:** TE p. 146 • **Evaluate:** SE pp. 163-168 TE p. 147b **<u>Additional resources:</u>** • TE p. 229a • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives.

		techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific "ELL Support" for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Unit Title: Grade 4 - Unit 2: How Organisms Process Information

How do animals use their perceptions and memories to make decisions?

In this unit of study, students are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. The crosscutting concepts of cause and effect, systems and system models, and structure and function are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in developing and using models. Students are expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on 4-LS1-2 and 4-PS4-2.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Developing and Using Models • Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)
    - Develop a model to describe phenomena. (4PS4-2)
  - **Disciplinary Core Ideas (DCI)**
    - LS1.D: Information Processing

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- 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. (4-LS1-2)
  - PS4.B: Electromagnetic Radiation
    - An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)
- **Crosscutting Concepts (CCC)**
  - Systems and System Models
    - A system can be described in terms of its components and their interactions. (4-LS1-1),(4LS1-2)
  - Cause and Effect
    - Cause and effect relationships are routinely identified. (4-PS4-2)

Central Idea / Enduring Understanding:	**Essential/Guiding Question:**
In this unit of study, students are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. The crosscutting concepts of *cause and effect, systems and system models,* and *structure and function* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *developing and using models*. Students are expected to use these practices to demonstrate understanding of the core ideas.	• How do animals receive and process different types of information from their environment in order to respond appropriately? • What happens when light from an object enters the eye?
Content: • A system can be described in terms of its components and its interactions. • 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. • Cause-and-effect relationships are routinely identified. • An object can be seen when light reflected from its surface enters the eyes.	**Skills (Student Learning Objectives):** • 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.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.] (4-LS1-2) • Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and

	seen, the cellular mechanisms of vision, or how the retina works.] (4-LS4-2)

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.4: Model with mathematics.
  - 4.G.A.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures
- **NJSLS – English Language Arts**
  - SL.UM.4.5: Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
  - 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
  - 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
  - 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about local and/or global climate change issues and deliberate about possible solutions.
  - 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions, designed to address the issue
  - 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
  - 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.
  - 9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology.
  - 9.4.5.IML.1: Evaluate digital sources of accuracy, perspective, credibility and relevance (e.g., Social Studies Practice-Gathering and Evaluating Sources).

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 4 Lesson 5

- **Engage:** Have students explain why peacocks have inherited showy tails.

Resources:

Pearson Chapter 4 Lesson 5

- **Envision It!:** SE pp. 148-149

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• **Explore:** How can some characteristics be affected by the environment? • **Explain:** Students read Characteristics of Living Things and answer questions. • **Elaborate:** Tell students how the peacock flounder's eyes come to be on the same side of its head. • **Evaluate:** Vocabulary Smart Cards Formative Assessment	• **Explore It!:** TE p. 148, blackline master • **Explain:** SE pp. 149-153 • **Elaborate:** TE p. 151 • SE pp. 163-168 TE p. 153b
<u>Pearson Chapter 4 Lesson 6</u> • **Engage:** Have students infer how monkeys respond to their environment. • **Explore:** My Planet Diary Misconception • **Explain:** Have students read Animal Behaviors, Animal Instincts, and Learned Behavior and answer the questions. • **Elaborate:** Science Notebook: Explain to students an instinctive behavior of toads that helps the protect themselves. • **Evaluate:** Vocabulary Smart Cards Formative Assessment	**<u>Pearson Chapter 4 Lesson 6</u>** • **Envision It!:** SE pp. 154-155 • **Explore:** SE p. 154, blackline master TE p. 159a • **Explain:** SE p. 155-159 • **Elaborate:** TE p. 158 • **Evaluate**: SE pp 163-168 TE p. 159b
<u>Pearson Chapter 1 Lesson 3</u> • **Engage:** Have students describe how bending light can change the way a frog partly in water looks. • **Explore:** What are some colors in white light? • **Explain:** Students will read Sources of Light, Light Waves We see, Prisms, and Matter. Answer questions • **Elaborate:** Science Notebook: Have students write the meaning of visible light spectrum in their Science Notebook. • **Evaluate:** Vocabulary Smart Cards Formative Assessment	**<u>Pearson Chapter 1 Lesson 3</u>** • **Envision It!:** SE pp. 22-23 • **Explore It!:** SE p. 22, blackline master TE p. 27a • **Explain:** SE pp. 23-27 • **Elaborate:** TE p. 25 • SE pp. 37-40 • TE p. 27b
<u>Additional learning opportunities/strategies:</u> • Inquiry STEM Activity: Natural Humidifier • Chapter 4 Inquiry: What Prey Does an Owl Eat? • STEM engineering: Plant Engineering • Websites	**<u>Additional resources:</u>** • SE pp. 116-119 • **Investigate It!:** SE pp. 160-161, blackline master TE p. 161b • TE p. 173 • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

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High-Achieving Students	**On Grade Level Students**	**Struggling Students**	**Special Needs/ELL**
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific “ELL Support” for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

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Unit Title: Grade 4 - Unit 3: Weathering and Erosion

What do the shapes of landforms and rock formations tell us about the past?

In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. The crosscutting concepts of patterns and cause and effect are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas.
This unit is based on 4-ESS2-1 and 4-ESS1-1.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - 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. (4-ESS2-1)
    - Constructing Explanations and Designing Solutions .
      - Identify the evidence that supports particular points in an explanation. (4-ESS1-1)
  - **Disciplinary Core Ideas (DCI)**
    - ESS2.A: Earth Materials and Systems
      - Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)
    - ESS2.E: Biogeology
      - Living things affect the physical characteristics of their regions. (4-ESS2-1)
    - ESS1.C: The History of Planet Earth
      - Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS11)
  - **Crosscutting Concepts (CCC)**
    - Cause and Effect
      - Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1)
    - Patterns
      - Patterns can be used as evidence to support an explanation. (4-ESS1-1)
    - Connections to Nature of Science
      - Scientific Knowledge Assumes an Order and Consistency in Natural Systems
        - Science assumes consistent patterns in natural systems. (4-ESS1-1)

Central Idea / Enduring Understanding:	**Essential/Guiding Question:**
In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. The crosscutting	• What do the shapes of landforms and rock formations tell us about the past?

<table>
<tr><td>concepts of patterns and cause and effect are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas.</td><td>● How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?
● What can rock formations tell us about the past?</td></tr>
<tr><td>Content:
● Cause-and-effect relationships are routinely identified, tested, and used to explain change.
● Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
● Rainfall helps to shape the land and affects the types of living things found in a region.
● Living things affect the physical characteristics of their regions.
● Science assumes consistent patterns in natural systems.
● Patterns can be used as evidence to support an explanation.
● 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.</td><td>Skills (Student Learning Objectives):
● Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [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.] (4-ESS2-1)
● 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 of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.] (4-ESS1-1)</td></tr>
<tr><td colspan="2">Interdisciplinary Connection(s):
● NJSLS – Math
○ MP.2: Reason abstractly and quantitatively.
○ MP.4: Model with mathematics.
○ MP.5: Use appropriate tools strategically.
○ 4.M.A.1: Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express</td></tr>
</table>

measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), …
    - 4.M.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
- **NJSLS – English Language Arts**
    - W.WR.4.5: Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
    - W.SE.4.6: Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
    - 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
    - 9.2.5.CAP2: Identify how you might like to earn an income.
    - 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about local and/or global climate change issues and deliberate about possible solutions.
    - 9.4.5.CL.3: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue.
    - 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
    - 9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology.
    - 9.4.5.IML.1: Evaluate digital sources for accuracy, perspective, credibility and relevance (e.g., Social Studies Practice-Gathering and Evaluating Sources).

Stage 2: Assessment Evidence

Performance Task(s):
- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers
- Performance Expectation Activity

Other Evidence:
- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 5
- **Inquiry:** How can you estimate how many animals live in an ecosystem?
- **Inquiry:** Home, Sweet Home

Resources:

Pearson Chapter 5
- **Try It!:** TE/SE p. 176
- **STEM Activity**: TE/SE p. 178

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Pearson Chapter 5 Lesson 1	**Pearson Chapter 5 Lesson 1**
● **Engage:** Ask students how they think the organisms interact.	● **Envision It:** TE/SE pp 182-183
● **Explore:** My Planet Diary	● SE p. 182, blackline master TEp. 187a
● **Explain:** Have students read Parts of an Ecosystem , Kinds of an Ecosystem, and Living Things Within an Ecosystem and answer questions	● SE pp. 183-187
● **Elaborate:** Science Notebook: Have students write about what might happen to an ecosystem if there were changes to the ecosystem's soil.	● TE p. 185
● **Evaluate:** Vocabulary Smart Cards Formative Assessment	● SE pp. 215-218 ● TE p. 187b
Pearson Chapter 5 Lesson 2	**Pearson Chapter 5 Lesson 2**
● **Engage:** Have students discuss the way humans have affected a deer's environment.	● **Envision it!:** TE/SE pp. 188-189
● **Explore:** What happens when one part of an ecosystem is removed?	● **Explore It!:** SE p.188, blackline master TE p. 193a
● **Explain:** How students read Changes to the Environment, Plants Cause Change, Animals Cause Change, and Humans Cause Sudden Change and answer questions	● SE pp. 187-193
● **Elaborate:** Science Notebook: Have students find out about other species that are invasive to the United States and ask them to write about one of the species.	● TE p. 190
● **Evaluate:** Vocabulary Smart Cards Formative Assessment	● SE pp. 215-218 ● TE p. 193b
Pearson Chapter 5 Lesson 3	**Pearson Chapter 5 Lesson 3**
● **Engage:** Have students describe some natural resources in an image.	● **Envision It!:** SE pp. 194-195
● **Explore:** How can you collect the sun's energy?	● **Explore It!:** SE p. 194, blackline master TE p. 199a
● **Explain:** Students read Natural Resources, Renewable Resources, Nonrenewable Resources. Answer questions	● **Explain:** SE pp. 195-199
● **Elaborate:** Science Notebook: Have students write about what people need to do as petroleum resources dwindle.	● **Elaborate:** TE p. 198
● **Evaluate:** Vocabulary Smart Cards Formative Assessment	● **Evaluate:** SE pp. 215-218 TE p. 199b

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Pearson Chapter 5 Lesson 5: ● **Engage:** Have students describe what they can learn about a dinosaur by examining its fossil. ● **Explore:** My Planet Diary/Misconception ● **Explain:** Have students read Windows to the Past, Fossils and Living Organisms and answer the questions. ● **Elaborate:** Science Notebook: Tell students that hadrosaurs were herbivores that had specialized teeth. Have students write about why scientists study what hadrosaurs ate. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment **Additional learning opportunities/strategies:** ● Performance Expectation Activity: Research and compare the advantages and disadvantages of renewable and nonrenewable energy sources. ● Websites	**Pearson Chapter 5 Lesson 5:** ● **Envision It!:** SE pp. 206-207 ● **Explore:** SE p. 206, blackline master TE p. 211a. ● **Explain:** SE pp. 207-211 ● **Elaborate:** TE p. 208 ● SE pp. 215-218 ● TE p. 211b **Additional resources:** ● TE p. 229d ● Bozemanscience.com ● http://ngss.nsta.org/ ● https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity).

		how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific "ELL Support" for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Unit Title: Grade 4 - Unit 4: Earth Processes

Is it possible to engineer ways to protect humans from natural Earth?

In this unit of study, students apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps. The crosscutting concepts of patterns, cause and effect, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.
This unit is based on 4-ESS2-2, 4-ESS3-2, 3-5-ETS1-2, and 3-5-ETS1-3.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Analyzing and Interpreting Data

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- Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)
- 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. (4-ESS3-2),(3-5-ETS1-2)
- 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. (3-5-ETS1-3)

- **Disciplinary Core Ideas (DCI)**
  - ESS2.B: Plate Tectonics and Large-Scale System Interactions
    - The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)
  - ESS3.B: Natural Hazards
    - A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.)
  - ETS1.B: Designing Solutions to Engineering Problems
    - Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)
  - ETS1.B: Developing Possible Solutions
    - Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5ETS1-2)
    - At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
    - Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5ETS1-3)
  - ETS1.C: Optimizing the Design Solution
    - Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)
- **Crosscutting Concepts (CCC)**
  - Patterns
    - Patterns can be used as evidence to support an explanation. (4-ESS2-2)
  - Cause and Effect
    - Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2
  - Connections to Engineering, Technology, and Applications of Science
    - Influence of Engineering, Technology, and Science on Society and the Natural World

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Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)
Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

</td></tr>
<tr><td>Central Idea / Enduring Understanding:
In this unit of study, students apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps. The crosscutting concepts of patterns, cause and effect, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.</td><td>Essential/Guiding Question:
● What can maps tell us about the features of the world?
● In what ways can the impacts of natural Earth processes on humans be reduced?</td></tr>
<tr><td>Content:
● Patterns can be used as evidence to support an explanation.
● Maps can help locate the different land and water features of Earth.
● 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.
● Cause-and-effect relationships are routinely identified, tested, and used to explain change
● Engineers improve existing technologies or develop new ones to increase benefits, decrease known risks, and meet societal demands.</td><td>Skills (Student Learning Objectives):
● 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.] (4-ESS2-2)
● 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 and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.] (4-ESS3-2)
● 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-ETS1-2)</td></tr>
</table>

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• A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions). • Humans cannot eliminate the hazards, but they can take steps to reduce their impacts. • Research on a problem should be carried out before beginning to design a solution. • Testing a solution involves investigating how well it performs under a range of likely conditions. • At whatever stage, communicating with peers about proposed solutions to a problem is an important part of the design process, and shared ideas can lead to improved designs. • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	• 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. (3-5-ETS1-3)

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.2: Reason abstractly and quantitatively.
  - MP.4: Model with mathematics.
  - MP.5: Use appropriate tools strategically
  - 4.M.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
  - 4.OA.A.1: Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- **NJSLS – English Language Arts**
  - RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text.
  - RI.MF.4.6: Use evidence to show how graphics and visuals (e.g., illustrations, charts, graphs, diagrams, timelines, animations) support central ideas
  - W.WR.4.5: Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
  - RI.4.9: Compare, contrast the treatment of similar themes, topics and patterns of events in informational texts from authors of different cultures.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills**

- 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests and other personal factors
- 9.1.5.RMI.2: Justify reasons to have insurance
- 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
- 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue.
- 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
- 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.DC.4: Model save, legal, and ethical behavior when using online or offline technology.
- 9.4.5.IML.2: Create visual representation to organize information about a problem or issue
- 9.2.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.
- 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics or symbols.

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 6

- **Inquiry and Engagement:** How can rocks and minerals be classified?

Pearson Chapter 6 Lesson 2

- **Engage:** Have students discuss what they think will happen when lava and water interact.
- **Explore:** What can you learn from rock layers?
- **Explain:** Have students read Classifying Rocks, Igneous Rocks, Sedimentary Rocks,

Resources:

Pearson Chapter 6

- **Try It!:** SE p. 232 TE pp. 232-233

Pearson Chapter 6 Lesson 2

- **Envision It!:** SE pp. 244-245
- **Explore:** SE p. 244, blackline master TE p. 253a
- **Explain:** SE pp. 245-253

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Metamorphic Rocks, and the Rock Cycle and answer questions. ● **Elaborate:** Tell students about two types of lava and have the infer which type cools more slowly. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment	● **Elaborate:** TE p. 247 ● **Evaluate**: SE pp. 281-284 TE p. 253b
<u>Pearson Chapter 6 Lesson 3</u> ● **Engage:** Have students describe what shapes a beach. ● **Explore:** How does a rock wear away? ● **Explain:** Have students read Earth's Surface, Weathering, Erosion and Deposition and answer the questions. ● **Elaborate:** Have students explain how the materials in a rock and the conditions around a rock can affect the rate at which physical weathering occurs. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment	**<u>Pearson Chapter 6 Lesson 3</u>** ● **Envision It!:** SE pp. 254-255 ● **Explore It!**: SE p. 254, blackline master TE p. 259a ● **Explain:** SE pp. 255-259 ● **Elaborate:** TE p. 257 ● SE pp. 281-284 TE p. 259b
<u>Pearson Chapter 6 Lesson 4</u> ● **Engage:** Have students describe how the land is changing. ● **Explore:** My Planet Diary: Science Stats ● **Explain:** Have students read Earth's Moving Plates, Volcanoes, Earthquakes, Landslides and Floods, and Droughts and answer the questions. ● **Elaborate:** With a partner, have students use a pencil to press a hole through a sheet of modeling clay to demonstrate how magma breaks through Earth's surface. ● **Evaluate:** Vocabulary Smart Cards Formative Assessment	**<u>Pearson Chapter 6 Lesson 4</u>** ● **Envision It!:** SE pp. 260-261 ● **Explore:** SE p. 260, blackline master TE p.265a ● **Explain:** SE pp. 261-265 ● **Elaborate:** TE p. 262 ● **Evaluate:** SE pp. 281-284 TE p. 265b
<u>Pearson Chapter 6 Lesson 5</u> ● **Explore it**: Where is Earth's water?	**<u>Pearson Chapter 6 Lesson 5</u>** ● **Explore:** Where is Earth's water? SE p. 266 TE p. 271a
<u>Additional learning opportunities/strategies</u>: ● **Inquiry STEM Activity**: Hold Water Back	**<u>Additional resources:</u>** ● **STEM Activity**: SE pp. 234-237

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• **Inquiry Investigate It:** How does the steepness of a stream affect how fast it flows? • **Inquiry Apply It!:** What affects how soil erodes? • **Websites**	• **Investigate It!**: SE pp. 278-279 • **Apply It!**: SE pp. 290-293 • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge.

			Utilize the ELL handbook for best practices and instructional strategies. Follow the specific "ELL Support" for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Unit Title: Grade 4 - Unit 5: Transfer of Energy

Where do we get the energy we need for modern life?

In this unit of study, fourth-grade students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students also obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment. The crosscutting concepts of cause and effect, energy and matter, and the interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.
This unit is based on 4-PS3-2 and 4-ESS3-1.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Planning and Carrying Out Investigations
      - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)
    - Obtaining, Evaluating, and Communicating Information
      - Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)
  - **Disciplinary Core Ideas (DCI)**
    - PS3.A: Definitions of Energy
      - Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2)
    - PS3.B: Conservation of Energy and Energy Transfer
      - Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2)
      - Light also transfers energy from place to place. (4-PS3-2)

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- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2)
- ESS3.A: Natural Resources
  - Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4ESS3-1)

- **Crosscutting Concepts (CCC)**
  - Energy and Matter
    - Energy can be transferred in various ways and between objects. (4-PS3-2)
  - Cause and Effect
    - Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)
  - Connections to Engineering, Technology, and Applications of Science
    - Interdependence of Science, Engineering, and Technology
      - Knowledge of relevant scientific concepts and research findings is important in engineering. (4ESS3-1)
    - Influence of Engineering, Technology, and Science on Society and the Natural World
      - Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1)

Central Idea / Enduring Understanding:

In this unit of study, fourth-grade students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students also obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment. The crosscutting *concepts of cause and effect, energy and matter,* and the *interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade- appropriate proficiency in *planning and carrying out investigations* and *obtaining, evaluating, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:

- How does energy move?
- From what natural resources are energy and fuels derived? In what ways does the human use of natural resources affect the environment?

Content:

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

Skills (Student Learning Objectives):

- Make observations to provide evidence that energy can be transferred from place to

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• Energy can be moved from place to place through sound, light, or electric currents. • Energy is present whenever there are moving objects, sound, light, or heat. • Light also transfers energy from place to place. • Energy can also be transferred from place to place by electric currents; the currents may have been produced to begin with by transforming the energy of motion into electrical energy. • Cause-and-effect relationships are routinely identified and used to explain change. • Knowledge of relevant scientific concepts and research findings is important in engineering. • Over time, people's needs and wants change, as do their demands for new and improved technologies. • Energy and fuels that humans use are derived from natural sources. • The use of energy and fuels from natural sources affects the environment in multiple ways. • Some resources are renewable over time, and others are not.	place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.] (4-PS3-2) • Obtain and combine information to describe that energy and fuels are derived from natural resources and 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.] (4-ESS3-1)

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.2: Reason abstractly and quantitatively.
  - MP.4: Model with mathematics.
  - 4.OA.A.1: Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- **NJSLS – English Language Arts**
  - W.WR.4.5: Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
  - W.SE.4.6: Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
  - 9.1.5.RMI.1: Identify risks that individuals and households face.
  - 9.2.5.CAP.1:2 Identify how you might like to earn an income
  - 9.2.5.CAP4: Explain the reasons why some jobs and careers require specific training, skills and certification.
  - 9.2.5.CAP.8: Identify risks that individuals and households face.

- 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.
- 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue.
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers
- Performance Expectation Activity

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 1

- **Inquiry:** What are some forms of Energy?
- **Inquiry:** Is It Cold In Here?

Pearson Chapter 1 Lesson 1

- **Engage:** How students think about the sounds and movements a plane might make.
- **Explore:** My Planet Diary Fun Fact
- **Explain:** Have students read Energy, Forms, Energy, Energy, and Motion, and Forms of Potential Energy and answer the questions.
- **Elaborate:** Science Notebook: Have students choose a type of energy presented in the lesson and list other examples of it.
- **Evaluate:** Vocabulary Smart Cards
  Formative Assessment

Pearson Chapter 1 Lesson 2

- **Engage:** Have students identify instruments that make high sounds and low sounds.
- **Explore:** My Planet Diary Fun Fact

Resources:

Pearson Chapter 1

- **Try It!**: SE pp. 2
- **STEM Activity**: SE pp. 4-7

Pearson Chapter 1 Lesson 1

- **Envision It!:** SE pp.8-9
- **Explore:** SE p. 8, blackline master TE p. 15a
- **Explain:** SE pp. 9-15
- **Elaborate:** TE p. 10
- **Evaluate**: SE pp. 37-40
  TE p. 15b

Pearson Chapter 1 Lesson 2

- **Envision It!:** SE pp. 16-17
- **Explore**: SE p. 16, blackline master p.21a

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• **Explain:** Have students read Sound, How Sound Travels, Frequency and Wavelength, Pitch, and Volume and answer questions. • **Elaborate:** Science Notebook: Have students draw a wave, label it, and define each part. • **Evaluate:** Vocabulary Smart Cards Formative Assessment **Pearson Chapter 1 Lesson 4** • **Engage:** Have students identify warm temperature areas in a thermogram. • **Explore:** How does heat move? • **Explain:** Have students read Conduction, A Conductive Example, Convection, Radiation, and Changes of Other Energy to Heat and answer the questions. • **Elaborate:** Science Notebook: Ask students to list things that circulate, then draw a diagram of a convection oven and label it to show how the oven cooks food. • **Evaluate:** Vocabulary Smart Cards Formative Assessment **Additional learning opportunities/strategies:** • **Inquiry:** Which material is the better heat conductor? • **Inquiry:** Which material is the best insulator? • Websites	• **Explain:** SE pp. 17-21 • **Elaborate:** TE p. 19 • **Evaluate:** SE pp. 37-40 TE p. 21b **Pearson Chapter 1 Lesson 4** • **Envision It!:** SE pp. 28-29 • **Explore It!:** SE p. 28 blackline master TE p. 33a • **Explain:** SE pp. 29-33 • **Elaborate:** TE p. 31 • **Evaluate:** SE pp. 37-40 TE p. 33b **Additional resources:** • **Investigate It!**: SE pp.34-35 • **Scaffolded Inquiry Support:** SE pp. 34-35, TE p. 35b • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science	Below-Level Content Reader Use project-based science learning to connect science with	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual

	with observable phenomena.	observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific “ELL Support” for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Unit Title: Grade 4 - Unit 6: Force and Motion

What is the relationship between the speed of an object and the energy of that object?

In this unit of study, students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object, and are expected to develop an understanding that energy can be transferred from object to object through collisions. The crosscutting concept of energy and matter is called out as an organizing concept. Students are expected to demonstrate grade-appropriate proficiency in asking questions, defining problems, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on 4-PS3-1 and 4-PS3-3.

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Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Planning and Carrying Out Investigations
      - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)
    - Asking Questions and Defining Problems
      - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)
    - Constructing Explanations and Designing Solutions
      - Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)
  - **Disciplinary Core Ideas (DCI)**
    - PS3.A: Definitions of Energy
      - The faster a given object is moving, the more energy it possesses. (4-PS3-1)
      - Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-3)
    - PS3.B: Conservation of Energy and Energy Transfer
      - Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-3)
    - PS3.C: Relationship Between Energy and Forces
      - When objects collide, the contact forces transfer energy so as to change the objects' motions. (4PS3-3)
  - **Crosscutting Concepts (CCC)**
    - Energy and Matter
      - Energy can be transferred in various ways and between objects. (4-PS3-1) (4-PS3-3)

Central Idea / Enduring Understanding:

In this unit of study, students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object, and are expected to develop an understanding that energy can be transferred from object to object through collisions. The crosscutting concept of *energy and matter* is called out as an organizing concept. Students are expected to demonstrate grade-appropriate proficiency in *asking questions, defining problems,* and *constructing explanations*, *and designing solutions*. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:

- What is the relationship between the speed of an object and its energy?
- In what ways does energy change when objects collide?

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Content:

- Energy can be transferred in various ways and between objects.
- The faster a given object is moving, the more energy it possesses.
- Energy can be transferred in various ways and between objects.
- 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.
- When objects collide, the contact forces transfer energy so as to change the objects' motions.

Skills (Student Learning Objectives):

- Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.] (4-PS3-1)
- Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.] (4PS3-3)

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.2: Reason abstractly and quantitatively.
  - MP.4: Model with mathematics.
- **NJSLS – English Language Arts**
  - RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text.
  - RL.IT.4.3. Describe the impact of individuals and events throughout the course of a text, using an in-depth analysis of the character, setting, or event that draws on textual evidence.
  - W. IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  - W.WR.4.5. Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
  - W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
  - 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification
  - 9.2.5.CAP.9" Justify reasons to have insurance
  - 9.4.5.CI.3: Participate in a brainstorming sessions with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
  - 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process.
  - 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

- 9.4.5.CT.3: Describe how digital tools and technology may be used to sovle problems.
- 9.4.5.DC.4: Model safe, legal and ethical behavior when using online or offline technology
- 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue.

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers
- Performance Expectation Activity

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 2

- **Inquiry:** How can you measure motion?

Pearson Chapter 2 Lesson 1

- **Engage:** Draw the path that a bouncing ball takes
- **Explore:** My Planet Diary: Misconception
- **Explain:** Have students read Motion, Relative Motion, Frame of Reverence, Forces Affect Objects, Force and Motion, Force and Mass, and Force of Gravity and answer the questions
- **Elaborate:** Write the term relative motion on the board. Ask students what they think the word relative means.
- **Evaluate:** Vocabulary Smart Cards
  Formative Assessment

Pearson Chapter 2 Lesson 2

- **Engage:** Have students decide which animal would win a 100 Meter race.
- **Explore:** What can change a marble's speed?
- **Explain:** Have students read Speed, Calculate Average Speed, and Velocity and Acceleration, and answer the questions
- **Elaborate:** Science Notebook: have students starck a marathoner and note his on her finishing time for three or four marathons.

Resources:

Pearson Chapter 2

- **Try It!:** SE pp. 48-49

Pearson Chapter 2 Lesson 1

- **Envision It!:** pp. 54-55
- SE p. 54, blackline master TE p. 61a
- SE pp. 55-61
- TE p. 56
- SE pp. 71-72
- TE p. 61b

Pearson Chapter 2 Lesson 2

- **Envision It!:** SE pp. 62-63
- **Explore It!:** SE p. 62, blackline master TE p. 67a
- SE pp 63-67
- Elaborate: TE p. 65

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• **Evaluate:** Vocabulary Smart Cards Formative Assessment **Additional learning opportunities/strategies:** • **Inquiry:** STEM: Let's Glide Away • **Inquiry:** Investigate It! How does friction affect motion? • **Websites**	• SE pp. 71-72 • TE p. 67b **Additional resources:** • SE pp. 50-53 • SE pp. 68-69 • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior

			knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific "ELL Support" for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Unit Title: Grade 4 - Unit 7: Waves and Information

How can we use waves to gather and transmit information?

In this unit of study, students use a model of waves to describe patterns of waves in terms of amplitude and wavelength and to show that waves can cause objects to move. The crosscutting concepts of patterns; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Developing and Using Models
      - Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1
    - 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. (4-PS4-3)
      - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)
    - Connections to Nature of Science
      - Scientific Knowledge is Based on Empirical Evidence
        - Science findings are based on recognizing patterns. (4-PS4-1)
      - 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. (3-5-ETS1-3)
  - **Disciplinary Core Ideas (DCI)**
    - PS4.A: Wave Properties

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- 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. (Note: This grade band endpoint was moved from K–2.) (4-PS4-1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

■ PS4.C: Information Technologies and Instrumentation
- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

■ ETS1.C: Optimizing The Design Solution
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)

■ ETS1.B: Developing Possible Solutions
- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5ETS1-3)

■ ETS1.C: Optimizing the Design Solution
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

○ **Crosscutting Concepts (CCC)**

■ Patterns
- Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena. (4-PS4-1)
- Similarities and differences in patterns can be used to sort and classify designed products. (4PS4-3)

■ Connections to Engineering, Technology, and Applications of Science
- Interdependence of Science, Engineering, and Technology
  - Knowledge of relevant scientific concepts and research findings is important in engineering. (4PS4-3)
- Influence of Science, Engineering, and Technology on Society and the Natural World
  - Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Central Idea / Enduring Understanding:	**Essential/Guiding Question:**
In this unit of study, students use a model of waves to describe patterns of waves in terms of amplitude and	• If a beach ball lands in the surf, beyond the breakers, what will happen to it?

<table>
<tr>
<td>wavelength and to show that waves can cause objects to move. The crosscutting concepts of patterns; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.</td>
<td>● Which team can design a way to use patterns to communicate with someone across the room?</td>
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<tr>
<td>Content:
● Science findings are based on recognizing patterns.
● Similarities and differences in patterns can be used to sort and classify natural phenomena.
● 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)
● Similarities and differences in patterns can be used to sort and classify designed products.
● Knowledge of relevant scientific concepts and research findings is important in engineering.
● Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
● 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—that is, convert it from digitized form to voice and vice versa.
● Processed and shared ideas can lead to improved designs.
● Tests are often designed to identify failure points or difficulties, which suggest the</td>
<td>Skills (Student Learning Objectives):
● Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.] (4-PS4-1)
● 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, and using Morse code to send text.] (4-PS4-3)
● 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-EST-1-2)
● 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. (3-5-ETS1-3)</td>
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elements of the design that need to be improved. ● Different solutions need to be tested in order to determine which of them best solve the problem, given the criteria and the constraints. ● Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. ● At whatever stage, communicating with peers about proposed solutions is an important part of the design	

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.2: Reason abstractly and quantitatively.
  - MP.4: Model with mathematics.
- **NJSLS – English Language Arts**
  - RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text.
  - RL.IT.4.3. Describe the impact of individuals and events throughout the course of a text, using an in-depth analysis of the character, setting, or event that draws on textual evidence.
  - W. IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  - W.WR.4.5. Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
  - W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
  - 9.1.5.FP.5: Illustrate how inaccurate information is disseminated through various external influencers including the media, advertisers/marketers, friends, educators, and family members.
  - 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
  - 9.2.5.CAP.3: Identity qualifications needed to pursue traditional and non-traditional careers and occupations
  - 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills and certifications.
  - 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.
  - 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process.
  - 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
  - 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

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Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter 3

- **Inquiry:** What can electricity flow through?

Pearson Chapter 3 Lesson 1

- **Engage:** Have students discuss why all the bulbs light up when they plug a string of lightbulbs into an electric outlet
- **Explore:** My Planet Diary Science Stats
- **Explain:** Have students read Electric Charges Flow, and Circuits and answer questions
- **Elaborate:** Ask students to use a water pipe analogy to explain whether a thick wire or a thin wire has more resistance
- **Evaluate:** Vocabulary Smart Cards
  Formative Assessment

Pearson Chapter 3 Lesson 2

- **Engage:** Have students discuss how electricity is important to plants
- **Explore:** How can a switch make a complete circuit
- **Explain:** Have students read Energy Changing Form, Light from Electricity, and Heat from Electricity and answer questions
- **Elaborate:** Ask students why they think fluorescent light bulbs are more efficient at producing light.
- **Evaluate:** Vocabulary Smart Cards
  Formative Assessment

Resources:

Pearson Chapter 3

- **Try It!:** SE pp. 80-81

Pearson Chapter 3 Lesson 1

- **Envision It!:** SE pp. 86-87
- TE p. 91a
- SE pp. 87-91
- TE p. 89
- SE pp. 99-100
- TE p. 91b

Pearson Chapter 3 Lesson 2

- **Envision It!:** SE pp. 92-93
- **Explore It!:** p. 92, blackline master TE p. 95a
- **Explain:** SE pp. 93-95
- TE p. 94
- SE pp. 99-100
- TE p. 95b

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Additional learning opportunities/strategies:	**Additional resources:**
• **Inquiry:** How can you keep liquids warm or cold?	• **STEM Activity:** SE pp. 82-85
Pearson Chapter P1	**Pearson Chapter P1**
• **Inquiry:** How do scientists make observations	• **Try It!**: SE pp. 298-299
Pearson Chapter P1 Lesson 1	**Pearson Chapter P1 Lesson 1**
• **Engage:** Have students discuss what questions scientists might ask about a natural formation	• **Envision It!**: SE pp. 304-305
• **Explore:** My Planet Diary: Science Stats	• SE p. 304, blackline master TE p. 307a
• **Explain:** Have students read Questions and Investigations and answer the questions	• SE pp. 305-307
• **Elaborate:** Science Notebook: Have students write the reference information about a scientific journal article, including its title, author, page, name of the journal, and date of publication.	• TE p. 306
• **Evaluate:** Vocabulary Smart Cards Formative Assessment	• SE pp. 333-336 • TE p. 307b
Pearson Chapter P1 Lesson 4	**Pearson Chapter P1 Lesson 4**
• **Engage:** Have students explain what they think the scientist is writing down	• **Envision It!:** SE pp. 322-323
• **Explore:** How can data help you draw a conclusion?	• **Explore It!:** SE p 322, blackline master TE p. 329a
• **Explain:** Have students read Record Procedures, Keep Records, Organize Your Data, Presenting Data, Evidence and Inferences, Reasonable Answers, Compare Results, and Go Further and answer the questions	• SE pp. 323-329
• **Elaborate:** Science Notebook: Have students make inferences about trees and write these inferences in their Science Notebook	• TE p. 326
• **Evaluate:** Vocabulary Smart Cards	• SE pp. 333-336
• Formative Assessment	• TE p. 329b
• **Websites**	• Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

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High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific “ELL Support” for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Science-Grade 4

Unit Title: Grade 4 - Unit 8: Using Engineering Design with Force and Motion System

How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?

In this unit of study, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of energy and matter and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems, planning and carrying out investigations, constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

This unit is based on 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-2, and 3-5-ETS1-3.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Constructing Explanations and Designing Solutions
      - Apply scientific ideas to solve design problems. (4-PS3-4)
      - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)
    - Asking Questions and Defining Problems
      - Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)
    - 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. (3-5-ETS1-3)
  - **Disciplinary Core Ideas (DCI)**
    - PS3.B: Conservation of Energy and Energy Transfer
      - Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-4)
    - PS3.C: Relationship Between Energy and Forces
      - When objects collide, the contact forces transfer energy so as to change the objects' motions. (4PS3-3)
    - PS3.D: Energy in Chemical Processes and Everyday Life
      - The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)
    - ETS1.A: Defining and Delimiting Engineering Problems

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- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (35-ETS1-1)
- ETS1.B: Developing Possible Solutions
  - Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5ETS1-2)
  - At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
  - Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5ETS1-3)
- ETS1.C: Optimizing the Design Solution
  - Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

- **Crosscutting Concepts (CCC)**
  - Energy and Matter
    - Energy can be transferred in various ways and between objects. (4-PS3-4)
  - Connections to Engineering, Technology, and Applications of Science
    - Influence of Engineering, Technology, and Science on Society and the Natural World
      - Engineers improve existing technologies or develop new ones. (4-PS3-4)
  - Connections to Nature of Science
    - Science is a Human Endeavor
      - Most scientists and engineers work in teams. (4PS3-4)
      - Science affects everyday life. (4-PS3-4)
    - Influence of Science, Engineering, and Technology on Society and the Natural World
      - People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
      - Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Central Idea / Enduring Understanding:	**Essential/Guiding Question:**
In this unit of study, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts	• *How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?*

energy from one form to another. The crosscutting concepts of *energy and matter* and the *influence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *asking questions and defining problems*, *planning and carrying out investigations*, *constructing explanations*, and *designing solutions*. Students are also expected to use these practices to demonstrate their understanding of the core ideas.	
Content: ● Science affects everyday life. ● Most scientists and engineers work in teams. ● Engineers improve existing technologies or develop new ones. ● People's needs and wants change over time, as do their demands for new and improved technologies. ● Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. ● Energy can be transferred in various ways and between objects. ● Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy ● 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). ● The success of a designed solution is determined by considering the desired features of a solution (criteria). ● Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	**Skills (Student Learning Objectives):** ● 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 electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; 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: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.] (4-PS3-4) ● 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-ETS1-1) ● 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-ETS1-2) ● 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. (3-5-ETS1-3)

● Research on a problem should be carried out before beginning to design a solution. ● Testing a solution involves investigating how well it performs under a range of likely conditions. ● At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. ● Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. ● Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	

Interdisciplinary Connection(s):

- **NJSLS – Math**
  - MP.2: Reason abstractly and quantitatively.
  - MP.4: Model with mathematics.
- **NJSLS – English Language Arts**
  - RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text.
  - RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text
  - W. IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  - W.WR.4.5. Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
  - W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
- **NJSLS – Career Readiness, Life Literacies, and Key Skills.**
  - 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
  - 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification.
  - 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
  - 9.4.5.CI.4: Research the development process of a product and identify the role of failure as part of the creative process.
  - 9.4.5.CT.3: Describe how digital tools and technology may be used to solve a problem.
  - 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.
  - .4.5.IML.2: Create a visual representation to organize information about a problem or issue.

- 9.4.5.TL.1: Compare the common uses of two different digital tools and identify the advantages and disadvantages of using both.
- 9.4.5.TL.5: Collaborate digitally to produce an artifact.

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- Formative assessment: "Lesson Check" blackline masters
- "Got It?" self-assessments in each lesson
- Complete graphic organizers

Other Evidence:

- Post-activity discussion questions
- Review Vocabulary Smart Cards
- Students elaborate in "Science Notebooks"
- Students make connections to the "Unlock the Big ?" in each lesson.
- Have students restate or contrast topics in each lesson

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Pearson Chapter P2

- Inquiry: How can you design a hovercraft?
- Inquiry: What's Inside?

Pearson Chapter P2 Lesson 1

- **Engage:** Have students identify some problems that a communications satellite might help solve.
- **Explore:** My Planet Diary Connections
- **Explain:** Have students read Scientific Discoveries, Technology and Transportation Systems, and Everyday Technologies and answer questions.
- **Elaborate:** Science Notebook: Ask students to write about how new technology in the future might change how they travel to school or work.
- **Evaluate:** Vocabulary Smart Cards
  Formative Assessment

Pearson Chapter P2 Lesson 2

- **Engage:** Have students consider why aircraft have different design
- **Explore:** How can the design of a model help you learn about the real thing?
- **Explain:** Have students read Design Process and Steps of the Design Process and answer the questions

Resources:

Pearson Chapter P2

- Try It! SE: pp. 344-345
- STEM Activity SE: pp. 346-349

Pearson Chapter P2 Lesson 1

- **Evision It!:** SE pp. 350-351
- p. 350 blackline master TE p. 355a
- SE pp. 351-355
- TE p. 352
- SE pp. 367-368
- TE p. 355b

Pearson Chapter P2 Lesson 2

- Evision It!: pp. 356-357
- Explore It!: p. 356, blackline master TE p. 363a
- Explain: SE pp. 357-363

Science-Grade 4

• **Elaborate:** Science Notebook, Have students identify a problem they could design a product to solve and identify the product's user. • **Evaluate:** Vocabulary Smart Cards Formative Assessment **Additional Learning Activities/Strategies:** • **Inquiry**: What design will carry cargo best? • **Review:** Performance-Based Assessment • **Websites**	• Elaborate: TE p. 358 • SE pp. 367-368 • TE p. 363b **Additional resources:** • **Design It!**: SE pp. 374-379 • SE pp. 380 • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ngss

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation.

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Advanced Leveled Content Reader Use project-based science learning to connect science with observable phenomena.	On-Level Content Reader Use project-based science learning to connect science with observable phenomena.	Below-Level Content Reader Use project-based science learning to connect science with observable phenomena. Utilize the If/Then strategies in the RTI section of the lesson/chapter Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	Below-Level Content Reader Utilize the support flaps in the leveled readers to provide support before-reading support (KWL charts, word webs), during-reading support (visual vocabulary support, strategies to determine word meanings, questioning while reading), and after-reading support (summative assessment, activity). Utilize the ELL lesson plan to identify content and language objectives. Use project-based science learning to connect science with observable phenomena. When using the write-in student edition, refer to graphic organizers, photographs, illustrations, and models

Science-Grade 4

			Use Envision it! to frontload the lesson by activating prior knowledge and building background knowledge. Utilize the ELL handbook for best practices and instructional strategies. Follow the specific “ELL Support” for each chapter in the TE. Support is given through scripted text, graphic organizers, etc.

Science Pacing Guide

Grade 4

MP	Units	Unit TOTAL*	Cumulative TOTAL**
MP1	**Unit 1 – Structures and Functions** Chapter 4: Try It!, Lesson 1, Lesson 2, Lesson 3, and Lesson 4	10 days	10 days
MP1	**Unit 2 – How Organisms Process Information** Chapter 4: Lesson 5 and Lesson 6; Chapter 1: Lesson 3	10 days	20 days
MP1	**Unit 3 – Weathering and Erosion** Chapter 5: Try It!, Lesson 1, Lesson 2, Lesson 3, and Lesson 5	10 days	30 days
MP1-2	**Unit 4 – Earth Processes** Chapter 6: Lesson 2, Lesson 3, Lesson 4, Lesson 5 (Where is Earth's Water? only)	10 days	40 days
MP2	**Unit 5 – Transfer of Energy** Chapter 1: Try It!, Lesson 1, Lesson 2, and Lesson 4	15 days	55 days
MP2	**Unit 6 – Force and Motion** Chapter 2: Try It!, Lesson 1, and Lesson 2	15 days	70 days
MP3	**Unit 7 – Waves and Information** Chapter 3: Try It!, Lesson 1, and Lesson 2; Chapter P1: Try It!, Lesson 1, and Lesson 4	15 days	85 days
MP3	**Unit 8 – Using Engineering Design with Force and Motion System** Chapter P2: Try It!, Lesson 1, and Lesson 2	15 days	100 days
MP1-3	**FLEX DAYS**	12 days	112 days

* Unit Total is inclusive of introduction, instruction, assessment, labs, projects, etc. for that particular unit.

** Cumulative Total is a running total, inclusive of prior and current units.