Science-Grade 5

Unit Title: Grade 5 - Unit 1: Properties of Matter

When matter changes, does its weight change?

In this unit of study, students describe that matter is made of particles too small to be seen by developing a model. The crosscutting concept of scale, proportion, and quantity is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and use these practices to demonstrate understanding of the core ideas.
This unit is based on 5-PS1-1, 5-PS1-3, 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)**
    - 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)
      - Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3) Developing and Using Models
      - Use models to describe phenomena. (5-PS1-1)
    - 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)
    - Constructing Explanations and Designing Solutions
      - 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)
  - **Disciplinary Core Ideas (DCI)**
    - PS1.A: Structure and Properties of Matter
      - Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)
      - Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)
    - ETS1.A: Defining and Delimiting Engineering Problems
      - 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. (3-5ETS1-1)
    - ETS1.B: Developing Possible Solutions
      - Research on a problem, such as climate change, 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. (3-5-ETS1-2)
      - 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)

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- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

○ **Crosscutting Concepts (CCC)**

■ Scale, Proportion, and Quantity

- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-3)
- Natural objects exist from the very small to the immensely large. (5-PS1-1)

■ Connections to Engineering, Technology, and Applications of Science

- 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)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
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 (e.g., W.4.6,3.MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
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 (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	
9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2)	Sending and receiving copies of media on the internet creates the opportunity for unauthorized use of data, such as personally owned video, photos, and music.
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).	Digital tools can be used to modify and display data in various ways

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9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.	that can be organized to communicate ideas.

Central Idea / Enduring Understanding:
In this unit of study, students describe that matter is made of particles too small to be seen by developing a model. The crosscutting concept of *scale, proportion, and quantity* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *developing and using models*, *planning and carrying out investigations*, and use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:
- When matter changes, does its weight change?
- How can properties be used to identify materials?
- What kind of model would best represent/ describe matter as made of particles that are too small to be seen?
- What are the properties of matter?

Content:
- Natural objects exist from the very small to the immensely large.
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by means other than seeing.
- A model showing that gasses are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

Skills (Student Learning Objectives):
- Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.] (5-PS1-3)
- Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic scale mechanism of evaporation and condensation or defining the unseen particles.] (5-PS1-1)
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)
- 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)
- 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)

Interdisciplinary Connection(s):
- **NJSLS - Math**
  - MP. 2: Reason abstractly and quantitatively.
  - MP. 4: Model with mathematics.
  - MP. 5: Model with mathematics.

- 5.NBT.A.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- 5.NF.B.7: Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
- 5.M.B.2: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.M.B.3: Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.

- **NJSLS - English Language Arts**
  - RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
  - W.WR.5.5. Establish a central idea about a topic, investigation, issue or event and use and quote several sources to support the proposed central idea.
  - W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources.

Stage 2: Assessment Evidence

Performance Task(s):

- "Inquiry labs"
- STEM activities
- 21st Century Learning
- 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:

PS1.A: Structure and Properties of Matter

Pearson Chapter 1: What are properties of matter?

- **Inquiry Engagement:** Students will demonstrate how the total volume of a mixture can be different than the combined volume of each part of the mixture.
- **Engage:** Have students describe colors in an image.
- **Explore**
- **Explain:** Have students read Matter, Elements, Atoms, Atomic Arrangement, and Compounds.
- **Elaborate:** Have students explain if they should be careful chewing cereal if the cereal box label says it contains iron.
- **Evaluation: Formative Assessment**

Resources:

Pearson Chapter 1

- **Try It:** How are weight and volume affected when objects are combined? SE/TE p. 2
- **STEM Activity:** Trap and Store, TE pp. 4-7
- **Envision It!:** SE/TE pp. 8-9
- **Explore:** My Planet Diary Fun Fact
  - SE/TE p. 8,
  - Blackline Master TE p. 15a
- **Explain:** Students will respond to questions SE/TE pp. 9-15
- **Elaborate:**
  - Science Notebook
  - TE p. 14
- **Evaluation:**

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Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Pearson Chapter 1 - Lesson 2: What are the properties of matter?

- **Engage:** Have students describe what allows a blimp to float.
- **Explore:** What are some properties of solids?
- **Explain:** Have students read Color, Mass, Volume, Temperature, and Texture
- **Elaborate:** Have students identify prefixes in milliliter and kiloliter. Then ask students which is greater, one milliliter or one kiloliter?
- **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content .

Pearson Chapter 1 - Lesson 3: What are solids, liquids, and gasses?

- **Engage:** Have students describe how solids, liquids, and gasses appear.
- **Explore:** How can water change state?
- **Explain:** Have students read States of Matter, Freezing and Melting, Evaporation and Condensation.
- **Elaborate:** Discuss with students that drivers in cold climates put alcohol-based liquid in their car to clean the windshield. Ask students how the alcohol keeps the water in the cleaning fluid from freezing?
- **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content .

Additional learning opportunities/strategies:

- Utilize online resources and web links to support learning.

  - Blackline Master, TE p. 15b

Pearson Chapter 1 - Lesson 2

- **Envision It!:** SE/TE pp. 16-17
- **Explore:**
  - SE p. 16
  - Blackline Master TE p. 21a
- **Explain:** Students will respond to questions SE/TE pp. 17-21
- **Elaborate:**
  - Science Notebook
  - TE p.19
- **Evaluation:**
  - Blackline Master, TE p. 21b

Pearson Chapter 1 - Lesson 3

- **Envision It!:** SE/TE pp. 22-23
- **Explore:**
  - SE/TE p. 22,
  - Blackline Master TE p. 27a
- **Explain:** Students will respond to questions SE/TE pp. 23-27
- **Elaborate:**
  - Science Notebook
  - TE p. 25
- **Evaluation:**
  - Blackline Master, TE p. 27b

Additional Resources:

- Material Properties: The dangerous Androvax has crash-landed on Earth! Sabotage his escape plans by tricking him into building a spaceship out of the wrong materials.
- Structure & Properties of Matter: In the first physical science video for the Next Generation Science Standards Paul Andersen explains the structure and properties of matter. He starts by explaining how all matter is made of about 100 smaller particles called matter. He explains a teaching progression for introducing the topic of matter K-12. This begins with a brief introduction

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	to substances that can be scientifically observed at many levels. This eventually builds through molecules and pure substances to the subatomic structure of atoms and the importance of binding energy. • http://www.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.

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Unit Title: Grade 5 - Unit 2: Changes to Matter

If I have a frozen water bottle that weighs 500 mg, how much will it weigh if the water melts?

In this unit of study, students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. The crosscutting concepts of cause and effect and scale, proportion, and quantity 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 using mathematics and computational thinking. Students are expected to use these practices to demonstrate understanding of the core ideas.
This unit is based on 5-PS1-4, 5-PS1-2, 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)**
    - 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)
      - 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. (5-PS1-4)
    - Using Mathematics and Computational Thinking
      - Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)
    - 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)
    - Constructing Explanations and Designing Solutions
    - 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)

  - **Disciplinary Core Ideas (DCI)**
    - PS1.A: Structure and Properties of Matter
      - The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
    - PS1.B: Chemical Reactions
      - When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)
    - ETS1.A: Defining and Delimiting Engineering Problems
      - 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. (3-5ETS1-1)
    - ETS1.B: Developing Possible Solutions
      - Research on a problem, such as climate change, 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. (3-5-ETS1-2)

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- 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. (3-5-ETS1-3)

- **Crosscutting Concepts (CCC)**
  - Cause and Effect
    - Cause and effect relationships are routinely identified and used to explain change. (5-PS1-4)
  - Scale, Proportion, and Quantity
    - Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2)
  - Connections to Nature of Science
    - Scientific Knowledge Assumes an Order and Consistency in Natural Systems
      - Science assumes consistent patterns in natural systems. (5-PS1-2)
  - Connections to Engineering, Technology, and Applications of Science
    - 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)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
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 (e.g., W.4.6,3.MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
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 (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	

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9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2),	Sending and receiving copies of media on the internet creates the opportunity for unauthorized use of data, such as personally owned video, photos, and music.
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).	Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.	

Central Idea / Enduring Understanding:
In this unit of study, students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. The crosscutting concepts of cause and effect and scale, proportion, and quantity 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 using mathematics and computational thinking. Students are expected to use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:
- If I have a frozen water bottle that weighs 500 mg, how much will it weigh if the water melts?
- How can we make slim?
- How can baking soda and vinegar burst a zip-lock bag?

Content:
- Natural objects exist from the very small to the immensely large.
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by means other than seeing.
- A model showing that gasses are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

Skills (Student Learning Objectives):
- Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4)
- Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]. (5-PS1-2)
- 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 solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)
- 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)

Interdisciplinary Connection(s):
- **NJSLS - Math**

- MP. 2: Reason abstractly and quantitatively.
- MP. 4: Model with mathematics.
- MP. 5: Model with mathematics.
- 5.NBT.A.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

- **NJSLS - English Language Arts**
  - W.WR.5.5. Establish a central idea about a topic, investigation, issue or event and use and quote several sources to support the proposed central idea.
  - W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of 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
- Aerogels "Go Green!"

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:

PS1.A: Structure and Properties of Matter

Pearson Chapter 1 - Lesson 4: What are mixtures and solutions?

- **Engage:** Have students describe parts of a mixture.
- **Explore:** How can a mixture be separated?
- **Explain:** Have students read Mixtures, Separating Mixtures, Solutions, and Solubility.
- **Elaborate:** Explain to students that the following terms can be used to describe solutions: saturated, concentrated, and dilute.
- **Evaluation: Formative Assessment**
  Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Pearson Chapter 1 - Lesson 5:
How does matter change?

- **Engage:** Have students describe the physical changes that occur when an orange is peeled.
- **Explore:** What happens when air heats up?

Resources:

Pearson Chapter 1 - Lesson 4

- **Envision It!:** SE/TE pp. 28-29
- **Explore:**
  - SE/TE p. 28,
  - Blackline Master TE p. 33a
- **Explain:** Students will respond to questions SE/TE pp. 29-33
- **Elaborate:**
  - Science Notebook
  - TE p. 32
- **Evaluation:**
  - Blackline Master, TE p. 33b

Pearson Chapter 1 - Lesson 5

- **Envision It!:** SE/TE p. 34-35
- **Explore:**
  - SE p. 34
  - Blackline Master TE p. 39a

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• **Explain:** Have students read Physical Changes, Temperature and Physical Changes, Chemical Changes, and Temperature and Chemical Changes • **Elaborate:** Have students identify prefixes in milliliter and kiloliter. Then ask students which is greater, one milliliter or one kiloliter? • **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content. **Unit Cumulative Activity** • **End of Unit Performance Assessment** **Additional learning opportunities/strategies:** • Utilize online resources and web links to support learning.	• **Explain:** Students will respond to questions SE/TE p. 35-39 • **Elaborate:** ○ Science Notebook ○ TE p.36 • **Evaluation:** ○ Blackline Master, TE p. 39b ○ Investigate It, SE/TE pp.40-41 **Additional Resources:** • Chemical Reactions: In this video Paul Andersen explains how chemical reactions progress as bonds are broken and reformed reformed. He explains the difference between changes in state and changes in molecules. He discussed collision theory and explains why increases in temperature and concentration can increase reaction rates. • Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ng • Time for Slime: https://www.acs.org/content/dam/acsorg/education/whatischemistry/adventuresinchemistry/experiments/timeforslime/slime-activity.pdf • Bubble Burst http://www.exploratorium.edu/science_explorer/bubblebomb.html • Flame Out: https://www.acs.org/content/dam/acsorg/education/whatischemistry/adventuresinchemistry/experiments/flameout/flame-experiment.pdf

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	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

		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).	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 5 - Unit 3: Energy and Matter in Ecosystems

What happens to the matter and energy that are part of each organism?

In this unit of study, students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals' food was once energy from the sun. The crosscutting concepts of energy and matter and systems and system models are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in developing and using models and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on 5-LS1-1, 5-LS2-1, 5-PS3-1, 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)**
    - Engaging in Argument from Evidence
      - Support an argument with evidence, data, or a model. (5-LS1-1)
    - Developing and Using Models
      - Develop a model to describe phenomena.(5-S2-1)

- Use models to describe phenomena. (5-PS3-1)
- 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)
- Constructing Explanations and Designing Solutions
  - 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)
- 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)**

- LS1.C: Organization for Matter and Energy Flow in Organisms
  - Plants acquire their material for growth chiefly from air and water. (5-LS1-1)
- LS2.A: Interdependent Relationships in Ecosystems
  - The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)
- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
  - Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)
- PS3.D: Energy in Chemical Processes and Everyday Life
  - The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)
- LS1.C: Organization for Matter and Energy Flow in Organisms
  - Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)
- ETS1.A: Defining and Delimiting Engineering Problems
  - 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. (3-5ETS1-1)
- ETS1.B: Developing Possible Solutions
  - Research on a problem, such as climate change, 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. (3-5-ETS1-2)
  - 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. (3-5-ETS1-3)

○ **Crosscutting Concepts (CCC)**

- Energy and Matter
  - Matter is transported into, out of, and within systems. (5-LS1-1)

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- Energy can be transferred in various ways and between objects. (5-PS3-1)
- Systems and System Models
  - A system can be described in terms of its components and their interactions. (5-LS2-1)
- Connections to the Nature of Science
  - Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena
    - Science explanations describe the mechanisms for natural events. (5-LS2-1)
- Connections to Engineering, Technology, and Applications of Science
  - 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)

Computer Science and Design Thinking

Standard	Performance Expectations	Core Ideas
8.2.5.ETW.5	Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources.

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
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 (e.g., W.4.6,3.MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
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 (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.	

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9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).	Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.	
9.4.5.TL.4	Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).	Collaborating digitally as a team can often develop a better artifact than an individual working alone.
9.4.5.TL.5	Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).	

Central Idea / Enduring Understanding:

In this unit of study, students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals' food was once energy from the sun. The crosscutting concepts of energy and matter and systems and system models are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in developing and using models and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:

- What happens to matter and energy that are part of each organism?
- Where do plants get the materials they need for growth?
- How does matter move among plants, animals, decomposers, and the environment?
- How can energy in animals' food be traced to the sun?

Content:

- Matter is transported into, out of, and within systems.
- Plants acquire their material for growth chiefly from air and water.
- Science explanations describe the mechanisms for natural events.
- A system can be described in terms of its components and their interactions.
- The food of almost any kind of animal can be traced back to plants.
- Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants.
- Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as *decomposers*.
- Decomposition eventually restores (recycles) some materials back to the soil.
- Organisms can survive only in environments in which their particular needs are met.

Skills (Student Learning Objectives):

- Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.] (5-LS1-1)
- Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.] (5-LS2-1)
- Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.] (5-PS3-1)

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• Energy can be transferred in various ways and between objects. • The energy released from food was once energy from the sun, which was captured by plants in the chemical process that forms plant matter (from air and water). • Food provides animals with the materials they need for body repair and growth and the energy they need for motion and to maintain body warmth.	• 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 solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2) • 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)

Interdisciplinary Connection(s):

- **NJSLS - Math**
  - MP. 2: Reason abstractly and quantitatively.
  - MP. 4: Model with mathematics.
  - 5.NBT.A.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- **NJSLS - English Language Arts**
  - RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text.
  - RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
  - RI.TS.5.4. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
  - W.AW.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
  - W.IW.5.2.A Introduce a topic clearly to provide a focus and group-related information logically; include text features such as headings, illustrations, and multimedia when useful to aid in comprehension.

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 • Unit Assessment	**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: **PS1.A: Structure and Properties of Matter** **Pearson Chapter 4 - Lesson 1: How do living things interact with their environment?** • **Inquiry Engagement**: Students will observe living and nonliving.	**Resources:** **Pearson Chapter 4 - Lesson 1** • **Try It**: What is in a local ecosystem? SE/TE p. 144 • **STEM Activity**: Let it Self-Water!, TE pp. 146-149

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• **Engage:** Ask students how they think plants get energy they need to live. • **Explore:** Discovery • **Explain:** Have students read Plants and Energy, Cells, and Tissues in Leaves, Photosynthesis, and Respiration • **Elaborate:** Explain to students explain in their Science Notebook why they think water lilies' pores are positioned differently than most other plants. • **Evaluation: Formative Assessment** Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.	• **Envision It!:** SE/TE pp. 150-151 • **Explore:** SE/TE p. 150, Blackline Master TE p. 157a • **Explain:** Students will respond to questions SE/TE pp. 151-157 • **Elaborate:** Science Notebook TE p. 152 • **Evaluation:** Blackline Master, TE. P. 157b
<u>Pearson Chapter 4 - Lesson 2: How do living things interact with their environment?</u> • **Engage:** Ask students to tell how the zebra and birds might interact. • **Explore:** What do some molds need to grow? • **Explain:** Have students read Interactions in Ecosystems, Energy Roles in Ecosystems, Food Chains, Food Webs, Roles in Ecosystems, and Symbiosis. • **Elaborate:** Have students discuss the sequence of energy in a prairie food chain and write the food chain in their Science Notebook. • **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.	**<u>Pearson Chapter 4 - Lesson 2</u>** • **Envision It!**: SE/TE pp. 158-159 • **Explore:** SE p. 158, Blackline Master TE p. 165a • **Explain**: Students will respond to questions SE/TE p.159-165 • **Elaborate:** Science Notebook TE p.163 • **Evaluation: B**lackline Master, TE p. 165b
<u>Pearson Chapter 4 - Lesson 3: How do ecosystems change</u>? • **Engage:** Have students describe what benefits a fallen tree might have for other organisms. • **Explore:** Fun Fact • **Explain:** Have students read Environmental Changes, Slow Changes, Fast Changes, Changes Caused by Organisms, Changes Caused by Humans, Adapting to Changes, and Survival • **Elaborate:** Students should focus on what their community might look like in 20 to 30 years. Have students discuss changes to bodies of water, wooded areas, and the numbers of living things. Ask students to list possible effects of these changes. • **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content • **End of Unit Performance Assessment**	**<u>Pearson Chapter 4 - Lesson 3</u>** • **Envision It!:** SE/TE pp. 166-167 • **Explore**: SE p. 166, Blackline Master TE p. 173a • **Explain:** Students will respond to questions SE/TE pp.167-173 • **Elaborate:** Science Notebook, TE p. 168 • **Evaluation:** ○ Blackline Master, TE p.173b

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Additional learning opportunities/strategies: ● Utilize online resources and web links to support learning.	**Additional Resources:** ● Organization for Matter & Energy Flow in Organisms: Sustaining life requires substantial energy and matter inputs. The complex struc- tural organization of organisms accommodates the capture, transformation, trans- port, release, and elimination of the matter and energy needed to sustain them. ● Interdependent Relationships in Ecosystems: How and why do organisms interact with their environment and what are the effects of these interactions? ● Types of Interactions: Paul Andersen explains how objects interact when touching and at a distance. Electromagnetic forces are very important when objects are touching and fields explain both electromagnetic and gravitational forces. The strong and weak nuclear forces can result in radioactive decay. A brief description of Newton's Law of Universal Gravitation and Coulomb's Law are includes. ● Energy in Chemical Processes & Everyday Life: In this video Paul Andersen explains how energy is used in chemical processes and everyday life. Students should understand that energy is neither created or destroyed but is converted. Most of the energy is delivered to our planet from the sun and is harvested through the process of photosynthesis. ● http://Bozemanscience.com ● http://ngss.nsta.org/ ● https://www.teachingchannel.org/ng ● Bottle Biology Terrarium: http://ngss.nsta.org/Resource.aspx?ResourceID=94 ● Biodomes Engineering Design Project: http://ngss.nsta.org/Resource.aspx?ResourceID=288

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.	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

		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).	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 5 - Unit 4: Water on the Earth

How do individual communities use science ideas to protect Earth's resources and environment?

In this unit of study, students describe and graph data to provide evidence about the distribution of water on Earth. The crosscutting concepts of scale, proportion, quantity and systems, and systems models are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in using mathematics and computational thinking and in 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 5-ESS2-2 and 5-ESS3-1.

Stage 1: Desired Results

Standards & Indicators:

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Using Mathematics and Computational Thinking
      - Describe and graph quantities such as area and volume to address scientific questions. (5-ESS22)
    - Obtaining, Evaluating, and Communicating Information
      - Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5ESS3-1)
  - **Disciplinary Core Ideas (DCI)**

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- ESS2.C: The Roles of Water in Earth's Surface Processes
  - Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)
- ESS3.C: Human Impacts on Earth Systems
  - Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

- **Crosscutting Concepts (CCC)**
  - Scale, Proportion, and Quantity
    - Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2)
  - Systems and System Models
    - A system can be described in terms of its components and their interactions. (5-ESS3-1)
  - Connections to Nature of Science
    - Science Addresses Questions About the Natural and Material World.
      - Science findings are limited to questions that can be answered with empirical evidence. (5ESS3-1)

Computer Science and Design Thinking

Standard	Performance Expectations	Core Ideas
8.2.5.ETW.1	Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources.
8.2.5.ETW.2	Describe ways that various technologies are used to reduce improper use of resources.	
8.2.5.ETW.3	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.	
8.2.5.ETW.4	Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.	
8.2.5.ETW.5	Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.	

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
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 (e.g., W.4.6, .MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand	Curiosity and a willingness to try new ideas (intellectual risk-taking)

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	one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	
9.4.5.DC.8	Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 3.5.GeoHE.1).	Digital engagement can improve the planning and delivery of climate change actions.
9.4.5.GCA.1	Analyze how culture shapes individual and community perspectives and points of view (e.g., 1.1.5.C2a, RL.5.9, 6.1.5.HistoryCC.8).	Culture and geography can shape an individual's experiences and perspectives.
9.4.5.TL.4	Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).	Collaborating digitally as a team can often develop a better artifact than an individual working alone.

Content:

- Standard units are used to measure and describe physical quantities such as weight and volume.
- Nearly all of Earth's available water is in the ocean.
- Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.
- A system can be described in terms of its components and their interactions.
- Science findings are limited to questions that can be answered with empirical evidence.
- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- Individuals and communities are doing things to help protect Earth's resources and environments.

Skills (Student Learning Objectives):

- Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.] (5ESS2-2)
- Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1)

Interdisciplinary Connection(s):

- **NJSLS - Math**
  - MP. 2: Reason abstractly and quantitatively.
  - MP. 4: Model with mathematics.
- **NJSLS - English Language Arts**
  - RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text.

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- RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
- RI.TS.5.4. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
- W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources.
- SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

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
- Create a Compost Pile, Go Green!

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:

PS1.A: Structure and Properties of Matter

Pearson Chapter 4 - Lesson 4: How do living things interact with their environment?

- **Engage:** Have students discuss how building and other human-made structures might affect the environment.
- **Explore:** Which materials break down fastest in soil?
- **Explain:** Have students read People Change Ecosystems.
- **Elaborate:** Have students write in their Science Notebook about things that help people but may have an ecosystem, such as a construction project that disrupts animal habitats.
- **Evaluation: Formative Assessment**
  Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Pearson Chapter 5 - Lesson 2: What are the spheres of Earth?

- **Engage:** Have students discuss which sphere of Earth might help a person windsurf.
- **Explore:** Fun Fact: Glaciers

Resources:

Pearson Chapter 4 - Lesson 4

- **Envision It!:** SE/TE pp. 174-175
- **Explore:**
  - SE/TE p. 174,
  - Blackline Master TE p. 177a
- **Explain:** Students will respond to questions
  - SE/TE pp. 175-177
- **Elaborate:**
  - Science Notebook
  - TE p. 176
- **Evaluation:**
  - Blackline Master, TE p. 177b

Pearson Chapter 5 - Lesson 2

- **Envision It!:** SE/TE 210-211
- **Explore:**
  - SE p. 210

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- **Explain:** Have students read Earth as a System, Atmosphere, Hydrosphere, The Lithosphere, and Biosphere.
- **Elaborate:** Have students write a short paragraph in their Science Notebook about a weather event that they have experienced.
- **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content .

Unit Cumulative Activity

- End of Unit Performance Assessment

Additional learning opportunities/strategies:

- Utilize online resources and web links to support learning.

    - Blackline Master TE p. 215a
- **Explain:** Students will respond to questions SE/TE pp. 211-215

- **Elaborate:**
    - Science Notebook
    - TE p. 212
- **Evaluation:**
    - Blackline Master, TE p. 215a

Additional Resources:

- The Role of Water in Earth's Surface Processes: In this video Paul Andersen explains the vital role that water plays in the processes on the Earth's surface. Water has several unique properties including high heat capacity, transparency, polarity and the ability to change the chemical behavior of the mantle.
- Human Impacts on Earth Systems: In this video Paul Andersen explains how humans are impacting the Earth through farming, mining, pollution and climate change. According to the NGSS wise management can reduce impacts on the planet. This will become more important as developing countries start consuming more resources.
- Bozemanscience.com
- http://ngss.nsta.org/
- https://www.teachingchannel.org/ng
- http://www.epa.gov/safewater/kids/grades_4-8_water_filtration.html
- http://www.epa.gov/ogwdw/kids/flash/flash_filtration.html

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.	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

		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).	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 5 - Unit 5: Earth Systems

How do individual communities use science ideas to protect Earth's resources and environment?

In this unit of study, students are able to describe ways in which the geosphere, biosphere, hydrosphere, and atmosphere interact. The crosscutting concept of systems and system models is called out as an organizing concept for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in developing and using models, 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 5-ESS2-1 and 5-ESS3-1.

Stage 1: Desired Results

Interdisciplinary Connection(s):

- **NJSLS – Science**
  - **Science and Engineering Practices (SEP)**
    - Developing and Using Models
      - Develop a model using an example to describe a scientific principle. (5-ESS2-1)
    - Obtaining, Evaluating, and Communicating Information
      - Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5ESS3-1)
  - **Disciplinary Core Ideas (DCI)**
    - ESS2.A: Earth Materials and Systems

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- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

- ESS3.C: Human Impacts on Earth Systems
  - Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

- **Crosscutting Concepts (CCC)**
  - Systems and System Models
    - A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1)
  - Connections to Nature of Science
    - Science Addresses Questions About the Natural and Material World.
      - Science findings are limited to questions that can be answered with empirical evidence. (5ESS3-1)

Computer Science and Design Thinking

Standard	Performance Expectations	Core Ideas
8.2.5.ETW.1	Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.	The technology developed for the human designed world can have unintended consequences for the environment. Technology must be continually developed and made more efficient to reduce the need for non-renewable resources.
8.2.5.ETW.2	Describe ways that various technologies are used to reduce improper use of resources.	
8.2.5.ETW.3	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.	
8.2.5.ETW.4	Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.	
8.2.5.ETW.5	Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.	

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
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 (e.g., W.4.6,3.MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand	Curiosity and a willingness to try new ideas (intellectual risk-taking)

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	one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.	
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).	Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.	
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.	Different digital tools have different purposes.
9.4.5.TL.4	Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).	Collaborating digitally as a team can often develop a better artifact than an individual working alone.
9.4.5.TL.5	Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).	

Central Idea / Enduring Understanding:
In this unit of study, students are able to describe ways in which the geosphere, biosphere, hydrosphere, and atmosphere interact. The crosscutting concept of systems and system models is called out as an organizing concept for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in developing and using models, obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Essential/Guiding Question:
- In what ways do the geosphere, biosphere, hydrosphere, and/or atmosphere interact?
- How do individual communities use science ideas to protect Earth's resources and environment?
- How does matter move among plants, animals, decomposers, and the environment?

Content:
- A system can be described in terms of its components and their interactions.
- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).

Skills (Student Learning Objectives):
- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and

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● The Earth's major systems interact in multiple ways to affect Earth's surface materials and processes. ● The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with landforms to determine patterns of weather.	climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.] (5-ESS2-1) ● Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1)

Interdisciplinary Connection(s):

- **NJSLS - Math**
  - MP. 2: Reason abstractly and quantitatively.
  - MP. 4: Model with mathematics.
  - 5.G.A.2: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
- **NJSLS - English Language Arts**
  - RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text.
  - RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
  - W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources.
  - SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

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
- Unit Assessment

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:

PS1.A: Structure and Properties of Matter

Pearson Chapter 5 - Lesson 1: How does water move through the environment?

- **Engage:** Have students circle an area on a map where they might find clear skies.
- **Explore:** How accurate are weather forecasts?

Resources:

Pearson Chapter 5 - Lesson 1

- **Envision It!:** SE/TE pp. 204-205
  - Blackline Master TE p. 209a
- **Explore:** How accurate are weather forecasts?

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● **Explain:** Have students read *Water in the Air, The Water Cycle and Energy in the Water Cycle* ● **Elaborate:** Have students make a drawing of how the water cycle works in their community. ● **Evaluation: Formative Assessment** Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.	● **Explain:** Students will respond to questions SE/TE pp. 205-209 ● **Elaborate:** ○ Science Notebook ○ TE p. 206 ● **Evaluation:** ○ Blackline Master, TE p. 209b
<u>Pearson Chapter 5 - Lesson 3: How does water move through the environment?</u> ● **Engage:** Have students circle an area on a map where they might find clear skies. ● **Explore:** How accurate are weather forecasts? ● **Explain:** Have students read Weather and Circulation. ● **Elaborate:** Have students draw a diagram of a simple mercury barometer. Ask students to predict whether the fluid would rise or lower in the tube if it were under higher pressure than it is showing their drawing. ● **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content	**<u>Pearson Chapter 5 - Lesson 3</u>** ● **Envision It!:** SE/TE pp. 216-217 ● **Explore:** ○ SE p. 216 ○ Blackline Master TE p. 223a ● **Explain:** Students will respond to questions SE/TE p. 217-223 ● **Elaborate:** ○ Science Notebook ○ TE p.218 ● **Evaluation:** ○ Blackline Master, TE p. 223b
<u>Pearson Chapter 5 - Lesson 4: How does water move through the environment?</u> ● **Engage:** Have students identify a six-pointed snowflake. ● **Explore:** Does a cloud form? ● **Explain:** Have students read *Water in the Air, Precipitation, and Types of Clouds.* ● **Elaborate:** Discuss with students the meaning of the Latin word *cirrus*. Then discuss why it is an accurate description of cirrus clouds. Also, have students use a dictionary to find the origin and meaning of altocumulus and stratus. ● **Evaluation: Formative Assessment** Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.	**<u>Pearson Chapter 5 - Lesson 4</u>** ● **Envision It!:** SE/TE 224-225 ● **Explore:** ○ SE p. 224 ○ Blackline Master, TE p. 229a ● **Explain:** Students will respond to questions SE/TE pp. 225-229 ● **Elaborate:** ○ Science Notebook ○ TE p. 228 ● **Evaluation:** ○ Blackline Master, TE p. 229b
<u>Pearson Chapter 5 - Lesson 6: How does water move through the environment?</u> ● **Engage:** Ask students what they think might cause natural rock formations? ● **Explore:** How does melting ice cause erosion?	**<u>Pearson Chapter 5 - Lesson 6</u>** ● **Envision It!:** SE/TE 236-237 ● **Explore:**

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• **Explain:** Have students read *Water Erosion and Deposition, and Wind Erosion and Deposition.* • **Elaborate:** Have students use the word erosion to write a sentence that demonstrates its meaning in their Science Notebook. • **Evaluation: Formative Assessment** Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content. • **End of Unit Performance Assessment** **Additional learning opportunities/strategies:** • Utilize online resources and web links to support learning.	○ SE p.236 ○ Blackline Master, TE p. 241a • **Explain:** Students will respond to questions SE/TE pp. 238-241 • **Elaborate:** ○ Science Notebook ○ TE p. 238 • **Evaluation:** ○ Blackline Master, TE p.241b **Additional Resources:** • Earth Materials & Systems: In this video Paul Andersen describes the four major spheres on planet Earth. The geosphere makes up the mass of the planet and includes the major landforms. The hydrosphere is all of the water and the atmosphere is all of the gases. The biosphere exists where the others spheres interface. • Natural Resources: In this video Paul Andersen explains how the resources required for survival come from the Earth. The resources are not evenly distributed on the planet and neither are the humans. According to the NGSS we need to limit the use of nonrenewable resources (like oil and coal) through regulations and increase the use of renewable resources. • http://Bozemanscience.com • http://ngss.nsta.org/ • https://www.teachingchannel.org/ng

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	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).

		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).	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 5- Unit 6: Interactions Within the Earth, Sun, and Moon System

What patterns do we notice when observing the sky?

In this unit of study, students develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of patterns, cause and effect, and scale, proportion, and quantity are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in analyzing and interpreting data and engaging in argument from evidence. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

This unit is based on 5-PS2-1, 5-ESS1-1, 5-ESS1-2, 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)**
    - Developing and Using Models
      - Develop a model using an example to describe a scientific principle. (5-ESS2-1)
    - Engaging in Argument from Evidence
      - Support an argument with evidence, data, or a model. (5-PS2-1), (5-ESS1-1)
    - Analyzing and Interpreting Data
      - Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)
    - Asking Questions and Defining Problems

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- 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)
- Constructing Explanations and Designing Solutions
  - 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)
- 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)**
  - PS2.B: Types of Interactions
    - The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)
  - ESS1.A: The Universe and its Stars
    - The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)
  - ESS1.B: Earth and the Solar System
    - The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)
  - ETS1.A: Defining and Delimiting Engineering Problems
    - 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. (3-5ETS1-1)
  - ETS1.B: Developing Possible Solutions
    - Research on a problem, such as climate change, 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. (3-5-ETS1-2)
    - 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. (3-5-ETS1-3)
- **Crosscutting Concepts (CCC)**
  - Cause and Effect
    - Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)
  - Scale, Proportion, and Quantity
    - Natural objects exist from the very small to the immensely large. (5-ESS1-1)
  - Patterns
    - Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)
  - Connections to Engineering, Technology, and Applications of Science
    - 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)

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Career Readiness, Life Literacies and Key Skills		
Standard	**Performance Expectations**	**Core Ideas**
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 (e.g., W.4.6,3.MD.B.3,7.1.NM.IPERS.6).	Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative 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 (e.g., 6.3.5.CivicsPD.3, W.5.7).	
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 (e.g., 8.2.5.ED.2, 1.5.5.CR1a).	Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.
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 (e.g., W.4.7, 8.2.5.ED.6)	
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).	
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.	
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).	
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).	Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.	
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.	Different digital tools have different purposes.
9.4.5.TL.4	Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).	Collaborating digitally as a team can often develop a better artifact than an individual working alone.
9.4.5.TL.5	Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).	

Central Idea / Enduring Understanding:	**Essential/Guiding Question:**
In this unit of study, students develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of patterns, cause and effect, and scale, proportion, and	• What patterns do we notice when observing the sky? • What effect does Earth's gravitational force have on objects?

<table>
<tr><td>quantity are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in analyzing and interpreting data and engaging in argument from evidence. Students are also expected to use these practices to demonstrate an understanding of the core ideas.</td><td>● What effect does the relative distance from Earth have on the apparent brightness of the sun and other stars?</td></tr>
<tr><td>Content:
● Cause-and-effect relationships are routinely identified and used to explain change.
● The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.
● Natural objects exist from the very small to the immensely large.
● The sun is a star that appears larger and brighter than other stars because it is closer.
● Stars range greatly in their distance from Earth.
● Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena.
● The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its north and south poles, cause observable patterns. These include:
○ Day and night
○ Daily changes in the length and direction of shadows
○ Different positions of the sun, moon, and stars at different times of the day, month, and year.</td><td>Skills (Student Learning Objectives):
● Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.] (5-PS2-1)
● Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).] (5ESS1-1)
● Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.] (5-ESS1-2)
● 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 solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)
● 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)</td></tr>
<tr><td colspan="2">Interdisciplinary Connection(s):
● NJSLS - Math
○ MP. 2: Reason abstractly and quantitatively.
○ MP. 4: Model with mathematics.</td></tr>
</table>

- 5.NBT.A.2: Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- 5.G.A.2: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

- **NJSLS - English Language Arts**
  - RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text.
  - RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
  - RI.TS.5.4. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
  - W.AW.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
  - SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

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
- Unit Assessment

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:

PS1.A: Structure and Properties of Matter

Pearson Chapter 2 - Lesson 1: What affects the motion of objects?

- **Engage:** Have students explain why a metal ring near a magnet does not fall.
- **Explore:** Misconceptions
- **Explain:** Have students read Contact Forces, and Non-Contact Forces
- **Elaborate:** Have students use a model car and a ramp to experiment with air resistance.
- **Evaluation: Formative Assessment**
  Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Pearson: Chapter 2 Lesson 4: How are shadows formed?

Resources:

Pearson Chapter 2 - Lesson 1

- **Envision It!:** SE/TE pp. 60-61
- **Explore:** SE/TE p. 60
  - Blackline Master TE p.65a
- **Explain:** Students will respond to questions SE/TE pp. 61-65
- **Elaborate:**
  - Science Notebook
  - TE p. 63
- **Evaluation:**
  - Blackline Master, TE p. 65b

Pearson Chapter 2 - Lesson 4

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• **Engage:** Have students compare a shadow and the object that makes the shadow- Tell how a shadow and the object that makes the shadow alike and different?
• **Explore:** What can cause the size and shape of a shadow to change?
• **Explain:** Have students read *Light Sources, Shadows*
• **Elaborate:** Have students write in their Science Notebook why shadows are different sizes and shapes.
• **Evaluation: Formative Assessment** Have students complete the Lesson Check blackline master to determine whether they need additional help with lesson content .
	• **Envision It!:** SE/TE 78-79
	• **Explore:** SE/TE p. 78
	  ○ Blackline Master TE p.81a
	• **Explain:** Students will respond to questions SE/TE p. 79-81
	• **Elaborate:**
	  ○ Science Notebook
	  ○ TE p. 80
	• **Evaluation:**
	  ○ Blackline Master, TE p. 81b

<u>Pearson Chapter 6</u> • **Inquiry Engagement**: Students will make a model of a spiral galaxy and view it from different angles.	**<u>Pearson Chapter 6</u>** • **Try It**: What does a spiral galaxy look like from different angles? SE/TE p. 258 • STEM Activity: Breathe Deeply, TE pp. 260-263

<u>Pearson Chapter 6 - Lesson 1: How do objects move in space?</u>
• **Engage:** Have students describe the path they think the sun will take across the sky during the course of a day.
• **Explore:** How does sunlight strike Earth's surface?
• **Explain:** Have students read *Sun, Earth's Rotation, Earth's Revolution, and Seasons.*
• **Elaborate:** Have students shine a flashlight on a globe and notice which parts of the globe have light shining on them. Have a partner turn the globe slowly and ask students to explain what they see.
• **Evaluation: Formative Assessment** Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.
	<u>Pearson Chapter 6 - Lesson 1</u>
	• **Envision It!:** SE/TE 264-265
	• **Explore:**
	  ○ SE p. 264
	  ○ Blackline Master TE p. 269a
	• **Explain:** Students will respond to questions SE/TE pp. 265-269
	• **Elaborate:**
	  ○ Science Notebook
	  ○ TE p. 267
	• **Evaluation:**
	  ○ Blackline Master, TE p. 269b

<u>Pearson Chapter 6 - Lesson 2: How do objects move in space?</u>
• **Engage:** Have students discuss whether or not they think the sun has a hard surface like Earth.
• **Explore:** Misconceptions
• **Explain:** Have students read Characteristics of the Sun, Constellations, and Stars on the Move Forces
• **Elaborate:** Have students write in their Science Notebook how the radio waves from a solar wind might affect radio communications on Earth.
	<u>Pearson Chapter 6 - Lesson 2</u>
	• **Envision It!:** SE/TE pp. 270-271
	• **Explore:**
	  ○ SE p. 270
	  ○ Blackline Master TE p. 275a
	• **Explain:** Students will respond to questions SE/TE pp. 271-275
	• **Elaborate:**
	  ○ Science Notebook
	  ○ TE p.273

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- **Evaluation: Formative Assessment**
  Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Pearson Chapter 6 - Lesson 3: How do objects move in space?

- **Engage:** Have students name the planet shown.
- **Explore:** How does distance affect orbiting time?
- **Explain:** Have students read *Planets, Objects, Mercury, Venus, Earth, and the Moon, and Mars.*
- **Elaborate:** Demonstrate for students the amount of time it takes radio waves to travel from Earth to the moon and from the Earth to Saturn.
- **Evaluation: Formative Assessment**
  Have students complete the Lesson Check Blackline Master to determine whether they need additional help with lesson content.

Additional learning opportunities/strategies:

- Utilize online resources and web links to support learning.

- **Evaluation:**
  - Blackline Master, TE p. 275b

Pearson Chapter 6 - Lesson 3

- **Envision It!:** SE/TE pp. 276-277
- **Explore:**
  - SE p.276
  - Blackline Master, TE p. 283a
- **Explain:** Students will respond to questions SE/TE pp. 277-28
- **Elaborate:**
  - Science Notebook
  - TE p. 278
- **Evaluation:**
  - Blackline Master, TE p. 229b

Additional Resources:

- Gravity and Falling Objects
- Solar System Exploration
- Our Super Star
- The Universe & Its Stars: Paul Andersen describes our place on the Earth in the Solar System within the Milky Way Galaxy in the Universe. The make-up and origins of the Universe are included along with stellar evolution. A teaching progression K-12 is also included.
- Earth & the Solar System: Paul Andersen describes our place on the Earth in the Solar System within the Milky Way Galaxy in the Universe. The make-up and origins of the Universe are included along with stellar evolution. A teaching progression K-12 is also included.
- Types of Interactions: Paul Andersen explains how objects interact when touching and at a distance. Electromagnetic forces are very important when objects are touching and fields explain both electromagnetic and gravitational forces. The strong and weak nuclear forces can result in radioactive decay. A brief description of Newton's Law of Universal Gravitation and Coulomb's Law are includes.
- http://Bozemanscience.com
- http://ngss.nsta.org/
- https://www.teachingchannel.org/ng

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 Pacing Guide

Grade 5

MP	Units	Unit TOTAL*	Cumulative TOTAL**
MP1	**Unit 1 – Properties of Matter** Chapter 1:Lesson 1, Lesson 2, and Lesson 3	15 days	15 days
MP1	**Unit 2 – Changes to Matter** Chapter 1: Lesson 4, Lesson 5, Investigate It!	15 days	30 days
MP2	**Unit 3 – Energy and Matter in Ecosystems** Chapter 4: Try It!, STEM activity, Lesson 1, Lesson 2, and Lesson 3	15 days	45 days
MP2	**Unit 4 – Water on the Earth** Chapter 4: Lesson 4; Chapter 5: Try It! and Lesson 2	15 days	60 days
MP2-3	**Unit 5 – Earth Systems** Chapter 5: Lesson 1, Lesson 3, Lesson 4, and Lesson 6	20 days	80 days
MP3	**Unit 6 – Interactions Within the Earth, Sun, and Moon System** Chapter 2: Try It!, Lesson 1, and Lesson 4; Chapter 6: Try It!, Lesson 1, Lesson 2, and Lesson 3	20 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.