Introduction

There is no doubt that science—and, therefore, science education—is central to the lives of all Americans. Never before has our world been so complex and science knowledge so critical to making sense of it all. When comprehending current events, choosing and using technology, or making informed decisions about one's healthcare, science understanding is key. Science is also at the heart of the United States' ability to continue to innovate, lead, and create the jobs of the future.

Through a collaborative, state-led process, new K–12 science standards have been developed that are rich in content and practice and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The Next Generation Science Standards are based on the Framework for K–12 Science Education developed by the National Research Council.

Every NGSS standard has three dimensions: disciplinary core ideas (content), scientific and engineering practices, and crosscutting concepts.

The NGSS focus on a smaller set of Disciplinary Core Ideas (DCI) that students should know by the time they graduate from high school, focusing on deeper understanding and application of content. ¬ Science and engineering are integrated into science education by raising engineering design to the same level as scientific inquiry in science classroom instruction at all levels, and by emphasizing the core ideas of engineering design and technology applications

The NGSS content is focused on preparing students for college and careers. The NGSS are aligned, by grade level and cognitive demand with the English Language Arts and Mathematics Common Core State Standards. This allows an opportunity both for science to be a part of a child's comprehensive education as well as ensuring an aligned sequence of learning in all content areas. The three sets of standards overlap and are reinforcing in meaningful and substantive ways.

Coupling practice with content gives the learning context, whereas practices alone are activities and content alone is memorization. It is through integration that science begins to make sense and allows students to apply the material.

Unit A Overview

Content Area: Science

Unit Title: Unit A Science, Engineering, and Technology

Target Course/Grade Level: 3

Unit Background

Science is a way of thinking – a way of understanding our world. Students are curious and naturally have questions. When students try to answer a question about their world, they are doing science. Science is a process as well as the facts and information that have been gained through the implementation of this process by others.

Because science is a process, students in the classroom can use the same techniques that scientists use. Scientists view the world with the mindset that no matter how mysterious something might seem there is a logical explanation.

Questioning is the basis of all scientific discovery. There are three types of questions that form scientific inquiry.

1. The "what" question is generally answered with a description. For example, *What type of soil is best for growing soybeans?*
2. The "how" question is answered with procedural knowledge that stems from greater inquiry. For example, to answer the question *How can I grow bigger soybean plants?* the variables that affect soybean growth need to be understood.
3. The "why" question rarely has a final answer, as each answer often leads to another question and can continue infinitely adding more scientific information to the existing body of knowledge.

Students, just like scientists, will use many tools such as hand lenses, balance scales, and graduated cylinders to carry out their investigations. Students are taught how to use each tool correctly and safely. Safety rules for the science lab are as important to successful scientific inquiry as the procedures for the investigation itself.

The scientific method contains the steps that scientists use to investigate the world. However, the steps are not followed in a lock-step order and actual methods may vary. What is important is that scientific inquiry is performed and shared in such a way that others can repeat and verify the investigation.

To many people, technology is synonymous with computers, telecommunications, and software; to children, it means entertainment such as video games. Technology however, is the practical application of knowledge in a particular area – or in other words, the use of scientific knowledge to solve practical problems. A solution that uses information from the fields of science and math is technology.

From *Science for All Americans*, (Rutherford & Ahlgren, 1991), engineering –the process of identifying a problem and designing a solution for it – is the component of technology most closely related to scientific inquiry and mathematical modeling. Science, technology, engineering and mathematics all converge in the design process. Engineering, through the design process, applies science and math to devise a general approach and then work out the smaller details of the solution.

Common examples of technology, although in this day and age we don't think of them as such, are simple machines. There are six simple machines that people use every day to help solve problems – the inclined plane, wedge, screw, lever, pulley, and wheel and axle.

An inclined plane is a flat surface set at an angle, such as a ramp. A wedge and a screw are derivations of the inclined plane. A wedge is a double inclined plane that tapers to a point or an edge, and is used to split objects

apart. Examples include knives, axes, and nails. A screw is an inclined plane wrapped around an axis and is found on jar lids and stools that spin up and down.

A wheel-and-axle simple machine consists of a wheel affixed to an axle providing leverage with which to turn the axle. Examples are screwdrivers, doorknobs, and faucet handles. These examples allow a small force to be applied to the wheel, which in turn applies a greater force to the axle.

The last group of simple machines is levers and pulleys. Both of these machines allow a small force to move a greater load. There are three classes of levers.

- Class 1 Levers are those in which the fulcrum is located between the load and the application of force (effort). Examples: see-saws and crowbars. A fixed pulley also works like a 1st class lever.
- Class 2 levers place the load between the force and the fulcrum, such as a wheelbarrow and a nutcracker.
- Class 3 levers have the effort between the load and the fulcrum, such as brooms, hockey sticks, and rakes.

Primary interdisciplinary connections: Reading, Math, Social Studies, Language Arts, Writing,

21st century themes:

- **Creativity and Innovation**
  - Think Creatively
  - Work Creatively with Others
  - Implement Innovations
- **Critical Thinking and Problem Solving**
  - Reason Effectively
  - Use Systems Thinking
  - Make Judgments and Decisions
  - Solve Problems
- **Communication and Collaboration**
  - Communicate Clearly
  - Collaborate with Others

Standard(s)

- **3-5 ETS1 Engineering Design**

Performance Expectations

- **3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
- **3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**
- **3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

Science and Engineering Practices

- **Asking Questions and Defining Problems**
  - Asking questions and defining problems in 3-5 builds on grades K-2 experiences and progresses to

specifying qualitative relationships.

- **Planning and Carrying Out Investigations**
  - Planning and carrying out investigations to answer questions or test solutions to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
- **Constructing Explanations and Designing Solutions**
  - Constructing explanations and designing solutions in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Disciplinary Core Ideas

- **ETS1.A: Defining and Delimiting Engineering Problems**
- **ETS1.B: Developing Possible Solutions**
- **ETS1.C: Optimizing the Design Solution**

Crosscutting Concepts

- **Influence of Science, Engineering, and Technology on Society and the Natural World**

Performance Expectations (PE)	**Supporting Concepts, Practices, and Ideas**
3-5-ETS1-1	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.
	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.
	People's needs and wants change over time, as do their demands for new and improved technologies.
3-5-ETS1-2	Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.
	Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
	At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
	Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
3-5-ETS1-3	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.
	Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
	Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Related Common Core ELA Standards	
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-5-ETS1-2)
RI.3.5	Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently. (3-5-ETS1-2)
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-5-ETS1-2)
W.3.7	Conduct short research projects that build knowledge about a topic.
W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
Related Common Core Mathematics Standards	
MP.2	Reason abstractly and quantitatively. (3-5-ETS1-1) (3-5-ETS1-2) (3-5-ETS1-3)
MP.4	Model with mathematics. (3-5-ETS1-1) (3-5-ETS1-2) (3-5-ETS1-3)
MP.5	Use appropriate tools strategically. (3-5-ETS1-1) (3-5-ETS1-2) (3-5-ETS1-3)
3-5.OA	Operations and Algebraic Thinking (3-5-ETS1-1) (3-5-ETS1-2)

Unit Essential Questions

- ***What questions do scientists ask?***
- ***What skills do scientists use?***
- ***How do scientists answer questions?***
- ***How do scientists communicate?***
- ***How do scientists use tools and stay safe?***
- ***What is technology?***
- ***What is a machine?***
- ***What is the design process?***

Unit Enduring Understandings

- **Scientific inquiry involves asking scientifically oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations**
- **Safety first!**
- **Mathematics is a tool used to model objects, events, and relationships in the natural and designed world**
- **The development of technology and advances in science are mutually supportive in driving innovation in both fields.**
- **Physical constraints and social values play a role in limiting the use of technology to solve problems.**
- **Thinking systematically means looking for the relationships between parts.**
- **Simple machines are tools that help us do work.**
- **Simple machines make work easier for us by changing the amount of force (pushing or pulling) needed to do certain kinds of work.**

Unit Learning Targets
Students will be Able To:

- explain what types of questions scientists ask
- observe, predict, measure, and use other process skills
- explain how scientists use experiments and other investigations to answer questions

- describe a procedure, record data, and understand how scientists communicate
- explain how scientists use tools and stay safe
- identify and describe ways that technology solves problems
- identify some simple machines and understand how they help people do some work
- explain how to conduct an investigation using the design process

Unit Vocabulary:

- **Chapter 1:** ***bar graph, chart, infer, inquiry, investigate, model, procedure, scientist, tool, unit of measure***
- **Chapter 2:** ***design process, inclined plane, lever, prototype, pulley, research, screw, technology, wedge, wheel and axle, work***

Evidence of Learning

Summative Assessments at the end of each chapter.

Equipment needed: See teacher's edition

Teacher Resources: Pearson Interactive Science
https://www.pearsonsuccessnet.com/snpapp/login/PsnLandingPage.jsp?showLandingPage=true&ticket=ST-1368125-E9Ki92wc0g5CVII9xxk5-b3-rumba-prod-01-01

Formative Assessments

- teacher observation
- student responses to questions
- student participation in inquiry activities
- student interactive science journal
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Lesson Plans

Chapter 1: The Nature of Science	Timeframe
Lesson 1 *What Questions Do Scientists Ask?*	**3-4 class periods**
Lesson 2 *What Skills Do Scientists Use?*	**3-4 class periods**
Lesson 3 *How Do Scientists Answer Questions?*	**3-4 class periods**
Lesson 4 *How Do Scientists Communicate?*	**3-4 class periods**
Lesson 5 *How Do Scientists Use Tools and Stay Safe?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How does a microscope help you make observations?***
- ***How do other objects look?***
- ***How do the properties of an object affect what you observe?***
- **Lightning Lab:** ***Questions and Answers***
- ***How can observations help you make an inference?***
- **At-Home Lab:** ***Estimate Length***
- ***How can a model help answer questions?***
- **Go Green:** ***Recycling Survey***

- ***How can scientists communicate what they learn?***
- **Lightning Lab:** ***Construct a Chart***
- ***How can a tool help scientists observe?***
- **Lightning Lab:** ***Which Tool Is It?***

Chapter 2: Technology and the Design Process	**Timeframe**
Lesson 1 *What is Technology?*	**3-4 class periods**
Lesson 2 *What is a Machine?*	**3-4 class periods**
Lesson 3 *What is the design process?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can you design a parachute?***
- ***What makes a bridge strong?***
- ***How would moving the books farther apart affect the strength of the bridge?***
- **At-Home Lab:** ***Transportation in the Future***
- ***How can a simple machine solve a problem?***
- **At-Home Lab:** ***Complex Machines***
- ***Which design transfers sound the best?***
- **Go Green:** ***Salvaged Solution***
- ***What parachute design works best?***

Teacher Notes:

Curriculum Development Resources

Click the links below to access additional resources used to design this unit:

- **Next Generation Science Standards (NGSS) http://www.nextgenscience.org/**
- **21st Century Skills http://www.p21.org/our-work/p21-framework**
- **New Jersey Standards Clarification Project http://www.nj.gov/education/aps/njscp/Phase1allAreas.pdf**

The Nature of Science: Lesson 1							
Content Area: Science							
Lesson Title: *What Questions Do Scientists Ask?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	x	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain what types of questions scientists ask	**Lesson Sequence** 1. **Engage:** Students discuss a question that a scientist could ask about orange trees. 2. **Explore:** Students read *My Planet Diary*. 3. **Explain**: Students read *Scientists*, *Questions*, and *Alone or in Teams*, then complete activities that incorporate reading skills and connect to other subjects. 4. **Lightning Lab**: ***Questions and Answers*** • Students tell what they would like to investigate and how they would go about it. 5. **Elaborate**: Students think about why it is important for scientists to ask questions about the world. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation:	

Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences
Resources Provided: *Pearson Interactive Science*

The Nature of Science: Lesson 2							
Content Area: Science							
Lesson Title: *What Skills Do Scientists Use?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • observe, predict, measure and use other process skills	**Lesson Sequence** 1. **Engage:** Students discuss what observations they can make about hurricanes based on a time-elapsed photo. 2. **Explore It!** ***How can observations help you make an inference?*** 3. **Explain**: • Review lesson objective • Students read *Science Skills, Estimate and Measure, Infer and Predict,* and *Interpret and Explain Data,* then complete activities incorporating reading skills.

	4. **At-Home Lab: *Estimate Length*** • Students share their results after estimating the length of objects and then measuring them. 5. **Math Connection: Classify.** Students use data in a chart and a graph to classify hurricanes. 6. **Elaborate**: Students write about a time they made a prediction. 7. **Evaluate**: • Review lesson vocabulary • Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

The Nature of Science: Lesson 3							
Content Area: Science							
Lesson Title: *How Do Scientists Answer Questions?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how scientists use experiments and other investigations to answer questions	**Lesson Sequence** 1. **Engage:** • Students discuss how certain things, such as models, can help answer questions. • Introduce lesson vocabulary. 2. **Explore It!** ***How can a model help answer questions?*** 3. **Explain**: • Review the lesson question. • Students read *Kinds of Investigations*, *Scientific Methods*, *Models*, and *Surveys*, then answer questions incorporating reading skills. 4. **Go Green:** ***Recycling Survey*** • Students share their observations from surveys about what materials people recycle in their homes. 5. **Elaborate**: • **Science Notebook**: Students explain why it sometimes is more helpful to study a model than the real thing. 6. **Evaluate**: • Review lesson vocabulary • Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

The Nature of Science: Lesson 4							
Content Area: Science							
Lesson Title: *How Do Scientists Communicate?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe a procedure, record data, and understand how scientists communicate	**Lesson Sequence** 1. **Engage:** a. Students discuss how keeping records helps scientists share information. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can scientists communicate what they learn?*** 3. **Explain**: a. Review the lesson question. b. Students read *Communication, Plan an Experiment, Keep Records, Share Your Investigation,* and *Repeat an Investigation* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Construct a Chart*** a. Students share their results from observing and classifying plants. 5. **Elaborate**:

	a. **Science Notebook**: Students convey information from the experiment in a third way. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

The Nature of Science: Lesson 5							
Content Area: Science							
Lesson Title: *How Do Scientists Use Tools and Stay Safe?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how scientists use tools and stay safe	**Lesson Sequence** 1. **Engage:** a. Students discuss how they think microscopes can help them view small objects. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can a tool help scientists observe?*** 3. **Explain**: a. Review the lesson question. b. Students read *Science Tools*, *Tools for Measuring and Observing*, *Safety*, and *Investigating Safely*, and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Which Tool Is It?*** a. Students share their results from describing and guessing various science tools from the lesson. 5. **Elaborate**: a. **Science Notebook**: Students write any questions they may have about tools scientists use. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Technology and the Design Process: Lesson 1							
Content Area: Science							
Lesson Title: *What is Technology?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • identify and describe ways that technology solves problems	**Lesson Sequence** 1. **Engage:** a. Students discuss the technology (a solar-powered car) in the picture and how they think it works. b. Introduce lesson vocabulary. 2. **Explore:** Students read *My Planet Diary* 3. **Explain**: a. Review the lesson question. b. Students read *Problems and Solutions*, and *Scientific Discoveries and Technology* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Transportation in the Future?*** a. Students share their drawings showing a tool that might help people get around in the future. 5. **Elaborate**: a. **Science Notebook**: Students draw and

	write about a form of technology. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Technology and the Design Process: Lesson 2							
Content Area: Science							
Lesson Title: *What is a Machine?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • identify some simple machines and understand how they help people do some work	**Lesson Sequence** 1. **Engage:** a. Students discuss how a pole helps a vaulter jump higher. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can a simple machine solve a problem?*** 3. **Explain**: a. Review the lesson question. b. Students read *Work*, *Simple Machines*, and *Complex Machines* and then answer questions incorporating reading skills. 4. **At-Home Lab:** ***Complex Machines*** a. Students share their results from drawing and labeling a complex machine. 5. **Elaborate**: a. **Science Notebook**: Students write a paragraph describing a simple machine and its use in their everyday lives. 6. **Evaluate**: a. Review lesson vocabulary c. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Technology and the Design Process: Lesson 3							
Content Area: Science							
Lesson Title: *What is the Design Process?*						**Timeframe:** 3-4 class periods	
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how to conduct an investigation using the design process	**Lesson Sequence** 1. **Engage:** a. Students compare two computers and look for differences. b. Introduce lesson vocabulary. 2. **Explore It!** ***Which design transfers sound the best?*** 3. **Explain**: a. Review the lesson question. b. Students read *Design Process, Identify the Problem, Do Research, Develop Possible Solutions, Choose One Solution, Design and Construct a Prototype, Test the Prototype, Communicate Results,* and *Evaluate and Redesign* and then answer questions incorporating reading skills. 4. **Go Green:** ***Salvaged Solution*** a. Students identify items they could salvage

	to build something that would solve a problem. 5. **Math Connection:** ***Read a Circle Graph*** a. Students analyze data about communication technology. 6. **Elaborate**: a. **Science Notebook**: Students survey classmates and design features for a new digital audio player. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Unit B Overview

Content Area: Science

Unit Title: Unit B Life Science: *Plants, Living Things,* and *Ecosystems*

Target Course/Grade Level: 3

Unit Background

Plants:

Photosynthesis is the process by which plants use energy from light to produce food. Although all green plant parts carry out photosynthesis, most occurs in a plant's leaves. During photosynthesis, the energy from light is trapped by chlorophyll and used to power a complex series of reactions that change carbon dioxide and water into sugars (glucose) and oxygen. Plants use some of the sugar for their own life processes, and the remainder is stored in the plant and provides energy for the animals that eat the plant.

Leaves are the plant organs that trap light and make food for the plant. A leaf consists of a blade and a stalk. The blade is where light is trapped and the stalk attaches the blade to the stem of the plant.

Leaves have layers of tissues and cells. The epidermis, a thin layer of brick-shaped cells, covers all the leaf's surfaces. A waxy cuticle covers the epidermis of some leaves reducing water loss and protecting the plants from wilting or drying out.

Inside the leaf are two layers of cells. The palisade layer has rows of closely packed cells and lies just below the upper layer of the epidermis. Between the palisade and the lower epidermis is a spongy layer of loosely arranged cells. Many of the cells of both layers contain chlorophyll that traps energy from light to use in photosynthesis. Other cells in the leaf make up the veins that transport water, nutrients, and food throughout the leaf.

The roots of a plant serve two purposes. They anchor the plant in the ground, and absorb, store, and transport water and nutrients to the rest of the plant. Roots absorb materials through root hairs, extensions of the root that are only one cell thick. Water and nutrients from the soil travel through the root hairs into the xylem, specialized tissues that transport water and nutrients up through the plant.

There are two main types of root systems. One, a taproot, is a long, thick, main root that stores food for the plant. Carrots, beets, and dandelions have a taproot system. Most trees and grasses have a fibrous root system characterized by many thin branches of roots. Plants with fibrous root systems help prevent soil erosion by wind and water.

Stems support the leaves of the plant. Food made in the leaves passes down the stem in phloem tissue. Plant stems may be herbaceous or woody. Herbaceous stems are soft and green. The woody stems of trees and shrubs are hard and rigid and contain a lot of xylem tissue.

Seed plants are vascular plants that have roots, stems, and leaves and that reproduce with seeds. There are two classes of seed plants: gymnosperms and angiosperms. Gymnosperms produce seeds that are not protected by a fruit, including pine, spruce, ginkgoes, and cycads. Many have seeds in cones and are also known as conifers.

Angiosperms are seed plants that produce seeds inside a fruit. They are called flowering plants. Flowers may be

showy, or hardly visible. There are two groups of angiosperms: monocots and dicots. Monocots have flower parts in threes and vascular bundles scattered throughout the stem. They were originally named for the single cotyledon, or seed leaf, in their seeds. Examples are grass, corn, and palms. Dicots have two seed leaves, flower parts in fours or fives, and vascular bundles in rings. Oak, rose, bean, and cabbage are dicots.

Living Things:

All animals share certain traits: they are multicellular organisms, their cells are eukaryotic (have a nucleus and organelles enclosed by a cell membrane), they cannot make their own food but must get energy by eating other plants or animals, most are motile (they move), they rely on sensory organs to tell them about their world.

One way animals can be classified is by the presence of a backbone. There are more invertebrates, than vertebrates. Scientists estimate that 98% of the world's animals lack a backbone. Some invertebrates are protozoa, annelids (ringed worms), echinoderms (starfish and sea urchins), mollusks (clams, snails, and squid), and arthropods (insects, crustaceans, and arachnids). Insects are the largest group of arthropods, having more than 800,000 different identified species. Insects live almost everywhere in the world and include flies, beetles, wasps, and ants.

Vertebrates are animals with backbones or spinal columns. The internal skeleton of these animals is called an endoskeleton. The vertebrae, skull, and other bones of the endoskeleton support and protect the animal's internal organs. Most vertebrates have two sets of paired limbs, such as arms, legs, or fins.

Vertebrates have evolved two ways of dealing with internal body temperature. Most vertebrates are ectothermic, their body temperature changes with the surroundings. Amphibians and reptiles are ectotherms. Endotherms are animals with a constant body temperature. Birds, mammals, and some fish are endotherms.

Vertebrates are grouped into seven different classes: jawless fish, cartilaginous fish, bony fish, amphibians, reptiles, birds, and mammals.

Plants share certain characteristics: multicellular organisms that have tissues and organs, their cells have walls made of cellulose, they contain chloroplasts (the cell parts containing chlorophyll). Plants can be classified based on the characteristics they inherit from their parents. Nonvascular plants absorb water directly into their cells. Vascular plants have tissues that act like tubes transporting water taken up by the plant's roots.

Most insects go through metamorphosis during their life cycle. The stages are egg, larva, pupa, and adult. During complete metamorphosis, the appearance of the insect changes significantly between the larva and adult stages. Incomplete metamorphosis has three stages: egg, larva, and adult. The insect grows in size but its appearance changes little. A grasshopper goes through incomplete metamorphosis.

Ecosystems:

An ecosystem is a place where living things and nonliving things interact. Biological influences on organisms within an ecosystem are called biotic factors (all the living things with which an organism might interact). Abiotic factors, or nonliving factors include temperature, precipitation, humidity, nutrient availability, soil type and sunlight.

Energy is constantly moving in an ecosystem. Energy flows from the sun to producers, then to various consumers. An ecosystem does not contain all the resources to satisfy the needs of all the living things in a particular habitat, so organisms must compete for the same resources. Plants and animals often change their habitat to obtain the resources they need.

An adaptation is any structure or behavior that helps an organism survive in its environment. Structural adaptations include a hummingbird's long beak that allows the bird to reach the nectar inside the flower, or a polar bear's black skin and white fur that allows it to absorb more solar energy. Behavioral adaptations include a spider's web or wolves hunting in a pack.

Plants too have adaptations for survival. Pine trees for example, have needle-like leaves with a waxy coating that slows water loss helping the tree survive cool, dry winters. Plants' life cycles are often adapted to the seasons. Annuals complete their life cycle in one year, biennials live for two years.

Deciduous trees have adapted to shed all of their leaves as cold weather approaches. Shedding leaves provides the plant with several advantages. If the leaves stayed on during the winter, water would freeze in the leaves causing significant harm to the tree. Losing leaves also reduces wind resistance, allowing wind to pass through the trees without causing damage. Scientists also think that leaf loss helps the tree cope with a lack of water during winter months.

Grasslands are ecosystems in which the main plants are grasses. These plants are adapted to grow well in dry conditions. The two main types of grasslands are savannas, and temperate grasslands. Savannas are grasslands with scattered individual trees prevalent in Africa and found in Australia, South America, and India. These grasslands are always found in warm climates where rainfall is concentrated in six or eight months of the year. This allows fires to burn in the other months and prevents the growth of forests.

Temperate grasslands have few if any trees or shrubs. Less rain falls, and temperature vary more from summer to winter. These grasslands are found in the central United States and in the steppes of the former Soviet Union. Soils are deep and rich and are used to grow grain crops such as wheat and corn.

Primary interdisciplinary connections: Reading, Math, Social Studies, Language Arts, Writing,

21st century themes:

- **Creativity and Innovation**
  - Think Creatively
  - Work Creatively with Others
  - Implement Innovations
- **Critical Thinking and Problem Solving**
  - Reason Effectively
  - Use Systems Thinking
  - Make Judgments and Decisions
  - Solve Problems
- **Communication and Collaboration**
  - Communicate Clearly
  - Collaborate with Others

Standard(s)

- **3-LS1 From Molecules to Organisms: Structures and Processes**
- **3-LS2 Ecosystems: Interactions, Energy, and Dynamics**

- **3-LS3 Heredity: Inheritance and Variation of Traits**
- **3-LS4 Biological Evolution: Unity and Diversity**

Performance Expectations

- **3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.**
- **3-LS2-1 Construct an argument that some animals form groups that help members survive.**
- **3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.**
- **3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.**
- **3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.**
- **3-LS4-3 Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.**
- **3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animal that live there may change.**

Science and Engineering Practices

- **Developing and Using Models**
  - Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- **Scientific Knowledge is Based on Empirical Evidence**
- **Engaging in Argument from Evidence**
  - Engaging in argument from evidence in 3-5 builds on K-2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).
- **Analyzing and Interpreting Data**
  - Analyzing and interpreting data in 3-5 builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
- **Constructing Explanations and Designing Solutions**
  - Constructing explanations and designing solutions in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Disciplinary Core Ideas

- **LS1.B: Growth and Development of Organisms**
- **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**
- **LS2.D: Social Interactions and Group Behavior**
- **LS3.A: Inheritance of Traits**
- **LS3.B: Variation of Traits**
- **LS4.B: Natural Selection**
- **LS4.C: Adaptation**
- **LS4.D: Biodiversity and Humans**

Crosscutting Concepts

- **Patterns**
- **Cause and Effect**
- **Systems and System Models**
- **Interdependence of Engineering, Technology, and Applications of Science**

Performance Expectations (PE)	**Supporting Concepts, Practices, and Ideas**
3-LS1-1	Develop models to describe phenomena
	Science findings are based on recognizing patterns.
	Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.
	Patterns of change can be used to make predictions.
3-LS2-1	Construct an argument with evidence, data, and/or a model.
	Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.
	Cause and effect relationships are routinely identified and used to explain change.
3-LS3-1	Analyze and interpret data to make sense of phenomena using logical reasoning.
	Many characteristics of organisms are inherited from their parents.
	Different organisms vary in how they look and function because they have different inherited information.
	Similarities and differences in patterns can be used to sort and classify natural phenomena.
3-LS3-2	Use evidence to support an explanation.
	Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.
	The environment also affects the traits that an organism develops.
	Cause and effect relationships are routinely identified and used to explain change.
3-LS4-2	Use evidence to construct an explanation.
	Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
	Cause and effect relationships are routinely identified and used to explain change.
3-LS4-3	Construct an argument with evidence.
	For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
	Cause and effect relationships are routinely identified and used to explain change.
3-LS4-4	Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.
	When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed

	environment, and some die.
	Populations live in a variety of habitats, and change in those habitats affects the organisms living there.
	A system can be described in terms of its components and their interactions.
	Knowledge of relevant scientific concepts and research findings is important in engineering.
Related Common Core ELA Standards	
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1) (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1) (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1) (3-LS4-3) (3-LS4-4)
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
W.3.7	Conduct short research projects that build knowledge about a topic. (3-LS1-1)
W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-2) (3-LS4-3) (3-LS4-4)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
SL.3.5	Create engaging audio recording or stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)
Related Common Core Mathematics Standards	
MP.2	Reason abstractly and quantitatively. (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
MP.4	Model with mathematics. (3-LS1-1) (3-LS2-1) (3-LS3-1) (3-LS3-2) (3-LS4-2) (3-LS4-3) (3-LS4-4)
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (3-LS4-2) (3-LS4-3)
3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves

	and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. (3-LS3-1) (3-LS3-2)
3.NBT	Number and Operations in Base Ten (3-LS1-1) (3-LS2-1)
3.NF	Number and Operations – Fractions (3-LS1-1)

Unit Essential Questions

- ***How can you classify plants?***
- ***How do plants use leaves to make food?***
- ***How do plants use roots and stems to grow?***
- ***How do plants use flowers or cones to reproduce?***
- ***What are the life cycles of some plants?***
- ***How can you classify animals?***
- ***How are offspring like their parents?***
- ***What are the life cycles of some animals?***
- ***What is an ecosystem?***
- ***How do living things get energy?***
- ***How do ecosystems change?***

Unit Enduring Understandings

- **Scientific inquiry involves asking scientifically oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations**
- **Safety first!**
- **Mathematics is a tool used to model objects, events, and relationships in the natural and designed world**
- **Thinking systematically means looking for the relationships between parts.**
- **All organisms transfer matter and convert energy from one form to another. ƒ**
- **Both matter and energy are necessary to build and maintain structures within the organism.**
- **Organisms are grouped in taxonomy based upon similarity.**
- **The structural and functional characteristics of an organism determine their continued survival over time under changing environmental conditions**
- **There are several ways in which elements and compounds react to form new substances and each reaction involves the flow of energy.**
- **Organisms and their environments are interconnected.**
- **Changes in one part of the system will affect other parts of the system.**
- **Humans can alter the living and non-living factors within an ecosystem, thereby creating changes in the overall system.**

Unit Learning Targets

Students will be Able To:

- classify plants into major groups, such as flowering and nonflowering plants, based on physical characteristics
- describe how leaves help plants live, grow, and produce food
- describe how roots and stems take in, transport or store water and nutrients the plant needs to grow
- explain how plants reproduce using seeds and cones
- demonstrate an understanding of how plants change during their life cycles

- classify animals into major groups according to their characteristics and behavior
- explain that some characteristics and behaviors are inherited and some are learned or acquired
- describe how different animals grow and change during their life cycles
- identify ways in which living and nonliving things interact within an ecosystem
- describe how energy flows through ecosystems in a food chain and explain how a food web is organized.
- demonstrate an understanding of how ecosystems change
- explain that some changes can help and others can harm the living things in an ecosystem

Unit Vocabulary:

- **Chapter 3:** ***carbon dioxide, flowering plant, germinate, life cycle, nutrient, oxygen, photosynthesis, pollinate, reproduce, spore***
- **Chapter 4:** ***arthropod, inherit, instinct, invertebrate, larva, metamorphosis, pupa trait, vertebrate***
- **Chapter 5:** ***adaptation, community, consumer, decomposer, ecosystem, food chain, habitat, population, producer***

Evidence of Learning

Summative Assessments at the end of each chapter.

Equipment needed: See teacher's edition

Teacher Resources: Pearson Interactive Science
https://www.pearsonsuccessnet.com/snpapp/login/PsnLandingPage.jsp?showLandingPage=true&ticket=ST-1368125-E9Ki92wc0g5CVII9xxk5-b3-rumba-prod-01-01

Formative Assessments

- teacher observation
- student responses to questions
- student participation in inquiry activities
- student interactive science journal
-
-

Lesson Plans

Chapter 3: Plants	Timeframe
Lesson 1 *How Can You Classify Plants?*	**3-4 class periods**
Lesson 2 *How Do Plants Use Leaves to Make Food?*	**3-4 class periods**
Lesson 3 *How Do Plants Use Roots and Stems to Grow?*	**3-4 class periods**
Lesson 4 *How Do Plants Use Flowers or Cones to Reproduce?*	**3-4 class periods**
Lesson 5 *What Are the Life Cycles of Some Plants?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How do plants change?***
- ***How does water move through celery?***
- ***Will water move both ways in a celery stalk?***

- **At-Home Lab:** ***Plants You See***
- ***How does sunlight affect plant survival?***
- **At-Home Lab:** ***Leaves and Air***
- ***Which way will roots grow?***
- **Lightning Lab:** ***Look at Plant Roots***
- ***What is inside a seed?***
- **Go Green:** ***Food and Energy***
- **At-Home Lab:** ***Draw a Life Cycle***

Chapter 4: Living Things	**Timeframe**
Lesson 1 *How Can You Classify Animals?*	**3-4 class periods**
Lesson 2 *How Are Offspring Like Their Parents?*	**3-4 class periods**
Lesson 3 *What Are the Life Cycles of Some Animals?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can shells be classified?***
- ***What do leaves have in common?***
- ***What other trait can be used to classify leaves?***
- ***How could you classify other plants or plant parts?***
- ***How does a backbone move?***
- **Lightning Lab:** ***Classify Different Animals***
- **At-Home Lab:** ***Look Alikes***
- ***What is the life cycle of a grain beetle?***
- **Go Green:** ***Frog Habitats***

Chapter 5: Ecosystems	**Timeframe**
Lesson 1 *What Is An Ecosystem?*	**3-4 class periods**
Lesson 2 *How Do Living Things Get Energy?*	**3-4 class periods**
Lesson 3 *How Do Ecosystems Change?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can you recycle some materials?***
- ***What can you find in your local ecosystem?***
- ***How might sunlight affect the living parts of an ecosystem?***
- **At-Home Lab:** ***Local Ecosystem***
- ***What do yeast use for energy?***
- **Lightning Lab:** ***Draw a Food Web***
- ***How can pollution affect an organism?***

- **Go Green:** ***Conserve Water***
-

Teacher Notes:

Curriculum Development Resources
Click the links below to access additional resources used to design this unit:

- **Next Generation Science Standards (NGSS)** http://www.nextgenscience.org/
- **21st Century Skills** http://www.p21.org/our-work/p21-framework
- **New Jersey Standards Clarification Project** http://www.nj.gov/education/aps/njscp/Phase1allAreas.pdf

Plants: Lesson 1							
Content Area: Science							
Lesson Title: *How Can You Classify Plants?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • classify plants into major groups, such as flowering and nonflowering plants, based on physical characteristics	**Lesson Sequence** 1. **Engage:** a. Students identify characteristics that would help them classify plants.. b. Introduce lesson vocabulary. 2. **Explore:** Students read **My Planet Diary** ***Science Stats*** and complete blackline master.

	3. **Explain**: a. Review the lesson question and objective(s). b. Students read *Classify Plants*, *Flowering Plants*, *Nonflowering Plants*, *Spores*, and *Rainforest Plants* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Plants You See*** a. Students draw a plant that grows in their neighbor hood and list three features of the plant. They bring their drawings to class, compare it with drawings done by others, and classify the plant as flowering or nonflowering. 5. **Elaborate**: a. **Science Notebook**: Students write a description and draw a picture of a plant that grows in their area, using a field guide as a reference. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Plants: Lesson 2							
Content Area: Science							
Lesson Title: *How Do Plants Use Leaves to Make Food?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how leaves help plants live, grow, and produce food	**Lesson Sequence** 1. **Engage:** a. Students discuss how leaves help plants. b. Introduce lesson vocabulary. 2. **Explore It!** ***How does sunlight affect plant survival?*** 3. **Explain**: a. Review the lesson question. b. Students read *What Plants Need*, *How Leaves Help Plants*, and *Other Ways Leaves Help Plants* and then answer questions incorporating reading skills. 4. **At-Home Lab:** ***Leaves and Air*** a. Students observe water transpired from

	tree leaves. 5. **Elaborate**: a. **Science Notebook**: Students examine a leaf, make a rubbing, and write a paragraph to explore the role of leaf veins. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Plants: Lesson 3							
Content Area: Science							
Lesson Title: *How Do Plants Use Roots and Stems to Grow?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							

***Integration of Technology: Pearson Interactive Science Program**
***Equipment needed: see teacher's edition**
***Vocabulary: see unit overview for all vocabulary associated with this unit**

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how roots and stems take in, transport, or store water and nutrients the plant needs to grow	**Lesson Sequence** 1. **Engage:** a. Students identify roots, stems, and leaves. b. Introduce lesson vocabulary. 2. **Explore It!** ***Which Way Will Roots Grow?*** 3. **Explain**: a. Review the lesson question. b. Students read *How Roots Help Plants, Types of Roots, How Stems Help Plants,* and *Types of Stems* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Look at Plant Roots*** a. Students examine two different roots and record the structures they see. 5. **Elaborate**: a. **Science Notebook**: Students identify the stems of various plants. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Plants: Lesson 4							
Content Area: Science							
Lesson Title: *How Do Plants Use Flowers or Cones to Reproduce?*				**Timeframe:** 3-4 class periods			
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how plants reproduce using seeds and cones	**Lesson Sequence** 1. **Engage:** a. Students discuss how insects help plants reproduce b. Introduce lesson vocabulary. 2. **Explore It!** ***What is inside a seed?*** 3. **Explain**: a. Review the lesson question. b. Students read *Reproduction, Parts of a Flower, How Seeds Grow,* and *How Cones Help Plants* and then answer questions incorporating reading skills. 4. **Go Green:** ***Food and Energy*** a. Students share ways of avoiding wasting

	food with their classmates. 5. **Math Connection: *Elapsed Time*** a. Students explore how long it takes for several plants to produce fruit. 6. **Elaborate**: a. **Science Notebook**: Students list foods that are seeds and those that are made from seeds. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Plants: Lesson 5							
Content Area: Science							
Lesson Title: *What Are the Life Cycles of Some Plants?*				**Timeframe:** 3-4 class periods			
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • demonstrate an understanding of how plants change during their life cycles	**Lesson Sequence** 1. **Engage:** a. Students number the stages in the life of a tomato plant. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Fun Fact*** 3. **Explain**: a. Review the lesson question. b. Students read *Plant Life Cycles, Life Cycle of a Flowering Plant, Life Cycle of a Conifer Plant, Other Plant Life Cycles,* and *Life Cycle Length* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Draw a Life Cycle*** a. Students grow a bean plant, draw each state of its life cycle, and make a poster using their drawings. 5. **Elaborate**: a. Students learn that some conifers have cones that remain tightly closed until exposed to fire. Students discuss what would happen to a jack pine forest if fires stopped occurring. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Living Things: Lesson 1							
Content Area: Science							
Lesson Title: *How Can You Classify Animals?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • classify animals into major groups according to their characteristics and behaviors	**Lesson Sequence** 1. **Engage:** a. Students identify characteristics of animals that would help them when classifying animals. b. Introduce lesson vocabulary. 2. **Explore It!** ***How does a backbone move?*** 3. **Explain**: a. Review the lesson question. b. Students read *Classify Animals, Animals with Backbones, Animals Without Backbones,* and *Animal Birth* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Classify Different Animals*** a. Students draw two animals, compare and contrast two features of the animals, and tell how they would classify the animals. 5. **Math Connection:**

	a. Students analyze a bar graph to answer questions about how fast some fish swim. 6. **Elaborate**: a. **Science Notebook**: Students create a two-column chart to classify vertebrates according to how they regulate their body temperature. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Living Things: Lesson 2							
Content Area: Science							
Lesson Title: *How Are Offspring Like Their Parents?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain that some characteristics and behaviors are inherited and some are learned or acquired.	**Lesson Sequence** 1. **Engage:** a. Students classify some animal behaviors as learned or instinctual.. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Discovery*** 3. **Explain**: a. Review the lesson question. b. Students read *Both Alike and Different, Inherited Characteristics, Acquired Characteristics, Inherited Behavior, Learned Behavior,* and *Small Differences in Traits* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Look Alikes*** a. Students collect pictures that show similar traits in parents and their offspring and use the pictures to make a poster. 5. **Elaborate**: a. Students learn about Gregor Mendel and the results of the pea plant experiments. The students predict what the offspring of a tall-stemmed and a short-stemmed pea plant would look like. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Living Things: Lesson 3							
Content Area: Science							
Lesson Title: *What Are the Life Cycles of Some Animals?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how different animals grow and change during their life cycles	**Lesson Sequence** 1. **Engage:** a. Students sequence the life cycle stages of a bald eagle. b. Introduce lesson vocabulary. 2. **Explore It!** ***What is the life cycle of a grain beetle?*** 3. **Explain**: a. Review the lesson question. b. Students read *Life Cycles*, *Life Cycle of a Butterfly*, *Life Cycle of a Frog*, and *Life Cycle of a Mammal* and then answer questions incorporating reading skills. 4. **Go Green:** ***Frog Habitats*** a. Students make a list of things that a frog's habitat must have and explain how they can help protect frog habitats. 5. **Elaborate**:

	a. Students learn that most young mammal stay with their parents for an extended period of time after they are born. b. Students discuss why they think it is important that mammals behave this way. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Ecosystems: Lesson 1							
Content Area: Science							
Lesson Title: *What is an Ecosystem?*						**Timeframe:** 3-4 class periods	
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • identify ways in which living and nonliving things interact within an ecosystem	**Lesson Sequence** 1. **Engage:** a. Students circle two living things and draw an X on two nonliving things in a picture. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Connections*** 3. **Explain**: a. Review the lesson question. b. Students read *Places for Living Things, Parts of an Ecosystem, Habitats, Groups Within Ecosystems*, and *Ecosystems Change* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Local Ecosystem*** a. Students share their observations about an ecosystem in a terrarium, park, or their backyard. 5. **Elaborate**: a. **Science Notebook**: Students write a paragraph about why a nonliving part of a swamp is important to the ecosystem. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Ecosystems: Lesson 2							
Content Area: Science							
Lesson Title: *How Do Living Things Get Energy?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how energy flows through ecosystems in a food chain and explain how a food web is organized	**Lesson Sequence** 1. **Engage:** a. Students identify organisms that can produce their own energy and organisms that must eat food to get energy. b. Introduce lesson vocabulary. 2. **Explore It!** ***What do yeast use for energy?*** 3. **Explain**: a. Review the lesson question. b. Students read *Energy Roles in Ecosystems*, *Food Chains*, and *Food Webs* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Draw a Food Web*** a. Students select an ecosystem, draw a food web that shows how energy is transferred within the ecosystem, and explains the possible effects of removing one part of the food web.

	5. **Elaborate**: a. **Science Notebook**: Students learn that the type of teeth a consumer has often relates to the kind of consumer it is. Students draw how they think the different kinds of teeth look. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Ecosystems: Lesson 3							
Content Area: Science							
Lesson Title: *How Do Ecosystems Change?*				**Timeframe:** 3-4 class periods			
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • demonstrate an understanding of how ecosystems change • explain that some changes can help and others can harm the living things in an ecosystem	**Lesson Sequence** 1. **Engage:** a. Students describe how a fire will affect organisms in an ecosystem. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can pollution affect an organism?*** 3. **Explain**: a. Review the lesson question. b. Students read *Ecosystem Change, Living Things That Cause Change, Natural Events Cause Change, Seasonal Change,* and *Living Things Return* and then answer questions incorporating reading skills. 4. **Go Green:** ***Conserve Water*** a. Students think about ways that they use water each day and list ways they can save water. 5. **Math Connection** a. Students analyze a graph that shows the changes in the Mexican gray wolf population over time. 6. **Elaborate**: a. Students learn that ash from a fire contains some nutrients and that rain may wash these nutrients back into the soil. b. Students discuss the impact the ash has on living things in this ecosystem. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Unit C Overview

Content Area: Science

Unit Title: Unit C Earth Science: *Earth and Weather* and *Earth and Our Universe*

Target Course/Grade Level: 3

Unit Background

The Water Cycle:

The continuous movement of water on, above, and below the surface of Earth is called the water (hydrologic) cycle. This cycle has no beginning or end. Water from Earth's surface evaporates when heated by the sun. Plants also lose water to the air through a process called transpiration. This water vapor cools as it rises and then condenses into clouds. Eventually the water droplets contained in the clouds becomes too heavy to stay aloft and fall to the ground as precipitation, and the cycle continues.

Minerals:

Minerals form in two main ways: through crystallization of melted material and crystallization of materials dissolved in water. Minerals form inside Earth as magma cools, or on Earth's surface as lava hardens. The rate at which magma cools affects the size of the crystals.

Magma deep inside Earth takes thousands of years to cool, yielding minerals with large crystals. Magma closer to the surface cools faster therefore minerals formed this way have smaller crystals.

One of the identifying characteristics of minerals is their hardness as measured against the scale developed by German mineralogist Friedrich Mohs in 1812. His scale is based on ten common minerals arranged from 1 (softest) to 10 (hardest), with talc being the softest having a rating of 1 and diamond, the hardest, rated a 10. Hardness is a measure of a material's resistance to scratching. To test an unknown material's hardness, find the hardest mineral it can scratch, or the softest mineral that can scratch it.

Stars:

Although to the human eye stars appear to be white, they are actually different colors and sizes. The larger the star, the cooler it tends to be and its colors are red and orange. Hotter stars are yellow, and the hottest are blueish-white. Our sun is a yellow, medium-sized star.

Scientists hypothesize that stars begin their lives as a huge cloud of gases (mostly hydrogen and helium) and dust. The force of gravity causes the dust and gases to move together, causing pressure within the cloud to rise. Eventually the core of the star begins to undergo nuclear fusion forcing hydrogen to fuse into helium. During this reaction energy, which we perceive as heat and light, is given off. The star slowly contracts over billions of years, during which time the pressure of the core rises along with its density. Stars eventually use up most of their hydrogen and begin to fuse helium at which time the outer layers expand and the star becomes a red giant. This cycle repeats when all the helium is gone and the star begins to fuse carbon. Eventually stars run out of fuel and become neutron stars.

Earth Movement:

Earth rotates on its axis, an imaginary line through the center connecting the North and South poles. A complete rotation takes 24 hours, or one day. While rotating, Earth revolves in an orbit around the sun that takes 365 days, or one year, to complete. The rotation of the Earth on its axis causes people to experience day and night; the tilt of the axis and Earth's revolution about the sun causes the seasons with their different weather patterns.

The Sun:

The sun contains 99.8 percent of all the mass in our solar system. Its gravitational pull keeps Earth and all the other objects in the solar system orbiting around it. The sun also rotates on an axis and takes 27 days to complete one rotation.

The sun is extremely hot. The temperature at its surface can rise to 5,600ºC (10,112ºF). The sun's core is even hotter – 15,000,000ºC (27,000,032ºF). The sun is made up mostly of hydrogen that is slowly being changed into helium through millions of nuclear reactions. According to scientists, the sun has enough hydrogen to last for about five billion more years.

Energy from the sun is responsible for every reaction that happens on Earth. Plants rely on the sun's energy for photosynthesis, the process whereby light energy is converted to glucose. Animals and humans gain energy by eating plants or other animals that have eaten plants. The water cycle depends on energy from the sun to evaporate water on Earth that eventually falls back to Earth as rain or snow. The energy from the sun also drives Earth's weather and climate.

Primary interdisciplinary connections: Reading, Math, Social Studies, Language Arts, Writing,

21st century themes:

- **Creativity and Innovation**
  - Think Creatively
  - Work Creatively with Others
  - Implement Innovations
- **Critical Thinking and Problem Solving**
  - Reason Effectively
  - Use Systems Thinking
  - Make Judgments and Decisions
  - Solve Problems
- **Communication and Collaboration**
  - Communicate Clearly
  - Collaborate with Others

Standard(s)

- **3-ESS2 Earth's Systems**
- **4-ESS2 Earth's Systems**
- **5-ESS1 Earth's Place in the Universe**
-

Performance Expectations

- **3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions**

expected during a particular season.

- **3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.**
- **4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.**
- **4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.**
- **5-ESS1-2 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.**

Science and Engineering Practices

- **Analyzing and Interpreting Data**
  - Analyzing data in 3-5 builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
- **Obtaining, Evaluating, and Communicating Information**
  - Obtaining, evaluating, and communicating information in 3-5 builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.
- **Planning and Carrying Out Investigations**
  - Planning and carrying out investigations to answer questions or test solutions to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

Disciplinary Core Ideas

- **ESS1.B: Earth and the Solar System**
- **ESS2.A: Earth Materials and Systems**
- **ESS2.B: Plate Tectonics and Large-Scale System Interactions**
- **ESS2.D: Weather and Climate**
- **ESS2.E: Biogeology**

Crosscutting Concepts

- **Patterns**

Performance Expectations (PE)	**Supporting Concepts, Practices, and Ideas**
3-ESS2-1	Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships.
	Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
	Patterns of change can be used to make predictions.
3-ESS2-2	Obtain and combine information from books and other reliable media to explain phenomena.
	Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
	Patterns of change can be used to make predictions.
4-ESS2-1	Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

	Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
	Living things affect the physical characteristics of their regions.
	Cause and effect relationships are routinely identified, tested, and used to explain change.
4-ESS2-2	Analyze and interpret data to make sense of phenomena using logical reasoning.
	The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land water features areas of Earth.
	Patterns can be used as evidence to support an explanation.
5-ESS1-2	Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships.
	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.
Related Common Core ELA Standards	
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2)
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (4-ESS2-2)
RI.3.9	Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
W.3.7	Conduct short research projects that build knowledge about a topic. (4-ESS2-2)
W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2) (4-ESS2-1)
Related Common Core Mathematics Standards	
MP.2	Reason abstractly and quantitatively. (3-ESS2-1) (3-ESS2-2) (4-ESS2-1)
MP.4	Model with mathematics. (3-ESS2-1) (3-ESS2-2) (4-ESS2-1)
MP.5	Use appropriate tools strategically (3-ESS2-1) (4-ESS2-1)
3.MD.A.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[1] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)

3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (3-ESS2-1)

Unit Essential Questions

- ***What is the water cycle?***
- ***What are weather and climate?***
- ***What are minerals and rocks?***
- ***What is soil?***
- ***How do we describe features of Earth's surface?***
- ***What are weathering and erosion?***
- ***What is a star?***
- ***What do you know about the solar system?***
- ***What are Earth's patterns?***
- ***What is known about the moon?***

Unit Enduring Understandings

- **Scientific inquiry involves asking scientifically oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations**
- **Safety first!**
- **Mathematics is a tool used to model objects, events, and relationships in the natural and designed world**
- **Thinking systematically means looking for the relationships between parts.**
- **Earth systems can be broken down into individual components that have observable measurable properties.**
- **Earth's components form systems. These systems continually interact at different rates of time affecting the Earth regionally and globally**
- **Technology enables us to better understand Earth's systems and the impact of Earth's systems on human activity.**
- **Observable, predictable patterns of movement in the Sun, Earth, and Moon system occur because of gravitational interaction and energy from the Sun.**
- **Physical characteristics of planets depend on their distance from the Sun and their size.**
- **The Sun is star.**
- **The universe is composed of galaxies, each of which is composed of solar systems having the same elements and governed by the same laws.**

Unit Learning Targets

Students will be Able To:

- explain the sequence of the water cycle
- distinguish between weather and climate
- recognize tools used to measure weather conditions
- explain what rocks are made from
- classify different types of rock
- describe what soil is made from
- explain what types of soil are best for growing plants

- describe Earth's landforms and the processes that form them
- describe how weathering and erosion change Earth's features
- describe how stars are different and what makes up star patterns
- list the planets of the solar system in order
- explain what causes daytime, nighttime, the seasons, and changes in shadows
- understand that the moon orbits Earth
- explain what causes the phases of the moon

Unit Vocabulary:

- **Chapter 6:** ***atmosphere, climate, condensation, erosion, evaporation, humidity, igneous rock, landform, lava, loam, metamorphic rock, mineral, precipitation, rock, sedimentary rock, soil, water cycle, weather, weathering***
- **Chapter 7:** ***axis, crater, light-year, moon phase, planet, revolution, rotation, solar system, star***

Evidence of Learning

Summative Assessments at the end of each chapter.

Equipment needed: See teacher's edition

Teacher Resources: Pearson Interactive Science
https://www.pearsonsuccessnet.com/snpapp/login/PsnLandingPage.jsp?showLandingPage=true&ticket=ST-1368125-E9Ki92wc0g5CVII9xxk5-b3-rumba-prod-01-01

Formative Assessments

- teacher observation
- student responses to questions
- student participation in inquiry activities
- student interactive science journal
-
-

Lesson Plans

Chapter 6: *Earth and Weather*	Timeframe
Lesson 1 *What is the Water Cycle?*	**3-4 class periods**
Lesson 2 *What are weather and climate?*	**3-4 class periods**
Lesson 3 *What are minerals and rocks?*	**3-4 class periods**
Lesson 4 *What is soil?*	**3-4 class periods**
Lesson 5 *How do we describe features of Earth's surface?*	**3-4 class periods**
Lesson 6 *What are weathering and erosion?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How does water temperature affect evaporation?***
- ***What can cause rock to crack?***

- ***How might thawing and refreezing change rock?***
- **Go Green:** ***Reduce Water Use***
- ***How does an anemometer work?***
- **Lightning Lab:** ***Measure and Record Temperature***
- ***How can you sort rocks?***
- **Lightning Lab:** ***Rock Detective***
- ***What makes up soil?***
- **Go Green:** ***Compost***
- **At-Home Lab:** ***Landforms and Water***
- ***How can water wear down a mountain?***
- **Lightning Lab:** ***Always Changing***

Chapter 7: ***Earth and Our Universe***	**Timeframe**
Lesson 1 *What is a star?*	**3-4 class periods**
Lesson 2 *What do you know about our solar system?*	**3-4 class periods**
Lesson 3 *What are Earth's patterns?*	**3-4 class periods**
Lesson 4 *What is known about the moon?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can you estimate the number of stars?***
- ***Why do you see phases of the moon?***
- ***What tool can help you observe the sun safely?***
- **At-Home Lab:** ***Star Pattern Search***
- ***What can you learn from a distance model of the solar system?***
- **Lightning Lab:** ***Planet Model***
- ***How can shadows change over time?***
- **Lightning Lab:** ***Angle of Light***
- **Go Green:** ***Air Pollution***

Teacher Notes:

Curriculum Development Resources
Click the links below to access additional resources used to design this unit:

- **Next Generation Science Standards (NGSS)** **http://www.nextgenscience.org/**
- **21st Century Skills** **http://www.p21.org/our-work/p21-framework**
- **New Jersey Standards Clarification Project** **http://www.nj.gov/education/aps/njscp/Phase1allAreas.pdf**

Earth and Weather: Lesson 1							
Content Area: Science							
Lesson Title: *What is the water cycle?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain the sequence of the water cycle	**Lesson Sequence** 1. **Engage:** a. Students circle the places where they think there is water. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Connections*** 3. **Explain**: a. Review the lesson question. b. Students read *Water on Earth* and *Water Cycle* and then answer questions incorporating reading skills. 4. **Go Green: *Reduce Water Use*** a. Students share three ways they could use less water. 5. **Elaborate**:

	a. **Science Notebook:** Students think about why the water cycle never stops. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Weather: Lesson 2							
Content Area: Science							
Lesson Title: *What are weather and climate?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • distinguish between weather and climate • recognize tools used to measure weather conditions	**Lesson Sequence** 1. **Engage:** a. Students describe the weather in the pictures shown. b. Introduce lesson vocabulary. 2. **Explore It!** ***How does an anemometer work?*** 3. **Explain**: a. Review the lesson question. b. Students read *Why We Measure Weather, Weather and Climate, Factors That Affect Climate, Factors That Affect Local Weather,* and *Tools for Measuring Weather* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Measure and Record Temperatures*** a. Students share their observations from recording temperatures over a weeklong period. 5. **Elaborate**: a. Students discuss how the air pressure at different points on a mountain would compare. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Weather: Lesson 3							
Content Area: Science							
Lesson Title: *What are minerals and rocks?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain what rocks are made from • classify different types of rock	**Lesson Sequence** 8. **Engage:** a. Students circle the two rocks in the picture they think are the same. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can you sort rocks?*** 3. **Explain**: a. Review the lesson question. b. Students read *Minerals and Rocks*, *Identifying Minerals*, and *Rock Groups* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Rock Detective*** a. Students share their observations about rocks and which rock group each rock belongs. 5. **Elaborate**:

	a. **Science Notebook:** Students make a chart that lists some objects they have used that are made of minerals. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Weather: Lesson 4							
Content Area: Science							
Lesson Title: *What is soil?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe what soil is made of • explain what types of soil are best for growing plants	**Lesson Sequence** 1. **Engage:** a. Students circle the soil they would use to grow a bean plant and discuss the reasons for their choice. b. Introduce lesson vocabulary. 2. **Explore It!** ***What makes up soil?*** 3. **Explain**: a. Review the lesson question. b. Students read *Parts of Soil, Soil Layers,* and *Kinds of Soil* and then answer questions incorporating reading skills. 4. **Go Green:** ***Compost*** a. Students share their observations about how compost helps enrich soil and keeps plants health. 5. **Math Connection** a. Students analyze a circle graph to examine the different substances in loam. 6. **Elaborate**: a. Students listen to information about decomposers and discuss their importance. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Weather: Lesson 5							
Content Area: Science							
Lesson Title: *How do we describe features of Earth's surface?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe Earth's landforms and the processes that form them	**Lesson Sequence** 1. **Engage:** a. Students describe various landforms. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Fun Fact*** 3. **Explain**: a. Review the lesson question. b. Students read *Landforms, Features on Earth's Surface,* and *Rapid Changes to Earth's Surface* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Landforms and Water*** a. Students draw pictures of two local landforms or bodies of water and explain how they may have formed. 5. **Elaborate**: a. Students learn that Earth's crust is made up of plates that are usually moving very

	slowly. Students predict what might happen if a plate moves suddenly. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Earth and Weather: Lesson 6							
Content Area: Science							
Lesson Title: *What are weathering and erosion?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how weathering and erosion change Earth's features	**Lesson Sequence** 1. **Engage:** a. Students discuss what forces they think could have shaped the rocks in the photo. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can water wear down a mountain?*** 3. **Explain**: a. Review the lesson question. b. Students read *Weathering by Plants, Weathering by Water, Erosion by Water, Erosion by Wind, Other Causes of Erosion, Deposition,* and *Weathering, Erosion, and Soil* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Always Changing*** a. Students share their observations about areas in their neighborhood that are affected by weathering or erosion. 5. **Elaborate**: a. **Science Notebook:** Students summarize different causes of weathering and erosion. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Our Universe: Lesson 1							
Content Area: Science							
Lesson Title: *What is a star?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how stars are different and what makes up star patterns	**Lesson Sequence** 1. **Engage:** a. Students complete a drawing of the Big Dipper. b. Introduce lesson vocabulary. 2. **Explore It!** ***What tool can help you observe the sun safely?*** 3. **Explain**: a. Review the lesson question. b. Students read *Star and Light, Types of Stars,* and *Patterns of Stars* and then answer questions incorporating reading skills. 4. **At-Home Lab:** ***Star Pattern Search*** a. Students observe stars, draw a group of stars, and give the group of stars a name. 5. **Elaborate**: **a. Science Notebook:** Students choose a

	constellation and research any legend connected to it. Students draw the constellation and write a summary of its legend. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Our Universe: Lesson 2							
Content Area: Science							
Lesson Title: *What do you know about our solar system?*				**Timeframe:** 3-4 class periods			
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							

***Equipment needed: see teacher's edition**
***Vocabulary: see unit overview for all vocabulary associated with this unit**

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • list the planets of the solar system in order	**Lesson Sequence** 1. **Engage:** a. Students draw an X on Earth and discuss how Earth is different from its neighboring planets. b. Introduce lesson vocabulary. 2. **Explore It!** ***What can you learn from a distance model of the solar system?*** 3. **Explain**: a. Review the lesson question. b. Students read *A Path Around the Sun; Parts of Our Solar System; Distance From the Sun; The Inner Planets; The Outer Planets; Pluto, a Dwarf Planet;* and *Asteroids and Comets* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Planet Model*** a. Students share their models of the solar system. 5. **Math Connection** a. Students read a chart to analyze how long it takes each outer planet to complete one revolution around the sun. 6. **Elaborate**: a. **Science Notebook:** Students draw and label a detailed object from this lesson. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners	

• leveled readers • resources to address multiple intelligences
Resources Provided: *Pearson Interactive Science*

Earth and Our Universe: Lesson 3							
Content Area: Science							
Lesson Title: *What are Earth's patterns?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain what causes daytime, nighttime, the seasons, and changes in shadows	**Lesson Sequence** 1. **Engage:** a. Students circle the positions of the sun at noon. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can shadows change over time?*** 3. **Explain**: a. Review the lesson question. b. Students read *How Earth Moves, Day and Night, Revolution Around the Sun, Seasons, Shadows During the Day*, and *Shadow Length During the Year* and then answer questions incorporating reading skills.

	4. **Lightning Lab:** ***Angle of Light*** a. Students share their observations from shining a reading lamp on paper from different angles. 5. **Elaborate**: a. Students learn a leap year relates to Earth's revolution around the sun and identify the number of days in a leap year. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Earth and Our Universe: Lesson 4							
Content Area: Science							
Lesson Title: *What is known about the moon?*				**Timeframe:** 3-4 class periods			
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • understand that the moon orbits Earth • explain what causes the phases of the moon	**Lesson Sequence** 1. **Engage:** a. Students identify the full moon phase and describe how the moon's shape seems to change. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Discovery*** 3. **Explain**: a. Review the lesson question. b. Students read *Motions of the Moon, Moon Phases, Characteristics of the Moon,* and *Telescopes* and then answer questions incorporating reading skills. 4. **Go Green: *Air Pollution*** a. Students make a list of ways they can reduce air pollution. 5. **Elaborate**: a. Students learn that the moon waxes and wanes during its phases. Students answer questions pertaining to waning and waxing. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Unit D Overview

Content Area: Science

Unit Title: Unit D Physical Science: *Matter, Energy and Its Forms,* and *Forces and Motion*

Target Course/Grade Level: 3

Unit Background

The Metric System:

The metric system is a system of measurement that is based on multiples of ten. The ease of changing from one unit to another makes the metric system quite useful. The United States uses a combination of the metric system and the customary, or English, system. Scientists use a form of the metric system called the International System of Units or SI. It was designed to provide a worldwide standard of physical measurement for science, technology, and industry. SI units include the meter, cubic meter, kilogram, and Kelvin.

Measuring Mass:

Mass is a physical characteristic of an object and is the amount of matter in that object. Other physical characteristics are length, volume, and area. Length is the distance from one end of an object to another. Volume is the amount of three-dimensional space an object takes up. In 1876 French scientists decided that the exact mass of one gram would be equal to the volume of one cubic centimeter of water. Using this definition, a cylinder was constructed to have the same mass as 1,000 cubic centimeters of water (1,000 g or 1 kg). This cylinder is still the standard for mass and is kept at the International Bureau of Weights in Sevres, France. A copy is located at the National Bureau of Standards in Washington, D.C.

Matter:

Matter is defined as anything that has mass and takes up space. It includes all the things you can see, touch, taste, or smell. Matter does not include light, sound, or heat, or forces such as magnetism or gravity. Matter is made up of tiny particles called atoms. Elements are matter that contains only one type of atom. There are about 118 known elements. Scientists have organized these elements in the periodic table based on patterns in their properties.

States of Matter:

The particles that make up matter are always in motion. In solids, particles vibrate back and forth but do not move about, causing a solid to always hold its shape. In liquids, the particles have a small amount of space in which to move around, slipping past one another. This is why liquids do not have a definite shape and can flow. In gases, the particles are relatively far apart, and their arrangement is completely random. This is why gases fill the space of a closed container.

Changes in State:

Adding or removing thermal energy can make a substance change state. During a change of state, the identity and mass of the substance does not change, but its properties do because the particles are arranged differently. When a

solid absorbs thermal energy, its particles begin to vibrate faster and faster, eventually separating from each other. This causes a solid to melt into a liquid. When even more thermal energy is absorbed, the particles vibrate faster still and the substance becomes a gas. This process is known as evaporation. When thermal energy is removed, the particles slow down and the gas becomes a liquid. As more thermal energy is removed, the particles slow further, and the substance freezes into a solid.

Energy:

Energy is defined as "the ability to cause change." Energy causes temperature to change, and can change the shape, speed, and direction of an object. Energy comes in different forms: electrical, mechanical, light, and chemical. All of these different forms can be classified into two groups: potential and kinetic energy. Kinetic energy is the energy of movement, whereas potential energy is the energy stored in an object prior to movement. Potential and kinetic energy are related. As one form increases, the other decreases. This relationship is the basis for the Law of Conservation of Energy that states that the total energy of an object, or group of objects, stays the same.

Changing Forms of Energy:

Energy transformations happen all the time. The energy of light waves changes to thermal energy as objects are warmed by the sun. The energy used to rub your hands together changes the energy of motion to thermal energy. No energy is ever gained or lost during transformations, just the form of energy changes. Other examples of energy transformations include

- making fires that release the energy stored in wood as thermal and light energy
- electrical energy changes into thermal energy to heat buildings and to light energy when a light bulb goes on
- the body transforms the chemical energy in food to the energy needed for the body to live and grow

Waves:

Waves carry energy and are defined as disturbances that travel through matter or space. Three features of waves are frequency, wavelength, and amplitude. Frequency is a measure of how many wave crests pass a point in a unit of time. Wavelength is the distance between crests. Higher frequency waves have shorter wavelength and greater energy. Amplitude is described as the height of the wave and is a measure of wave's power.

Light:

Light is a form of energy known as electromagnetic radiation. Visible light makes up a small portion of this radiation. The entire spectrum also includes radio waves, infrared waves, ultraviolet waves, gamma waves, and X-rays. Light can travel at the speed of 300,000 kilometers (186,000 miles) per second through empty space. No matter or energy can travel faster than the speed of light.

Refraction is the bending of waves as they change speed. Light can change speed as it passes from one transparent substance to another. The amount of refraction depends on the wavelength of light as well as the material through which it passes. This property of light was first used by Isaac Newton to separate white light into its spectrum of colors using a prism. When sunlight (white light) strikes a group of raindrops, the raindrops act like prisms and separate the light into its component colors forming a rainbow.

Newton's Laws of Motion:

The first law of motion is the law of inertia. Inertia is the tendency of an object to resist change in its motion. Newton's first law states that an object at rest will remain at rest, and an object that is moving at a constant

velocity will continue moving at a constant velocity unless acted upon by an unbalanced force. Newton's second law of motion explains that acceleration is produced when a force acts on a mass. In science, acceleration refers to the rate at which the velocity of an object changes. It can mean speeding up, slowing down, or changing direction. The third law of motion states that for every action there is an equal but opposite reaction.

Friction:
Friction is the contact force that acts against the motion of an object. There are four types of friction: static, sliding, rolling, and fluid. Static friction acts on objects that are not moving, such as a heavy box. An object with static friction needs extra force, such as a push, to begin moving. Once the object is moving, there is sliding friction at work. Sliding friction occurs when two solid surfaces slide over each other. Rolling friction occurs when an object rolls across a surface; fluid friction occurs when a solid object moves through a fluid.

Free Falling:
Gravity is a force that affects all objects on Earth. When gravity is the only force acting on a falling object, that object is said to be in free fall. All objects in free fall accelerate at the same rate regardless of their masses. However, not all objects land at the same time due to air resistance.

Primary interdisciplinary connections: Reading, Math, Social Studies, Language Arts, Writing,

21st century themes:

- **Creativity and Innovation**
  - Think Creatively
  - Work Creatively with Others
  - Implement Innovations
- **Critical Thinking and Problem Solving**
  - Reason Effectively
  - Use Systems Thinking
  - Make Judgments and Decisions
  - Solve Problems
- **Communication and Collaboration**
  - Communicate Clearly
  - Collaborate with Others

Standard(s)

- **3-PS2 Motion and Stability: Forces and Interactions**
- **2-PS1 Structure and Properties of Matter**
- **4-PS3 Energy**
-

Performance Expectations

- **3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.**
- **2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.**
- **2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can**

be reversed and some cannot.

- **4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.**
- **4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electrical currents.**
- **4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.**

Science and Engineering Practices

- **Planning and Carrying Out Investigations**
  - Planning and carrying out investigations to answer questions or test solutions to problems I 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
- **Scientific Investigations Use a Variety of Methods**
- **Engaging in Argument from Evidence**
- **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**
- **Asking Questions and Defining Problems**
  - Asking questions and defining problems in grades 3-5 builds on grades K-2 experiences and progresses to specifying qualitative relationships.
- **Constructing Explanations and Designing Solutions**
  - Constructing explanations and designing solutions in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Disciplinary Core Ideas

- **PS1.A: Structure and Properties of Matter**
- **PS1.B: Chemical Reactions**
- **PS2.A: Forces and Motion**
- **PS2.B: Types of Interactions**
- **PS3.A: Definitions of Energy**
- **PS3.B: Conservation of Energy and Energy Transfer**
- **PS3.C: Relationship Between Energy and Forces**

Crosscutting Concepts

- **Cause and Effect**
- **Patterns**
- **Energy and Matter**

Performance Expectations (PE)	**Supporting Concepts, Practices, and Ideas**
3-PS2-1	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.
	Science investigations use a variety of methods, tools, and techniques.
	Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.

	Objects in contact exert forces on each other.
	Cause and effect relationships are routinely identified.
2-PS1-1	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.
	Different kinds of matter exist and many of them can either be solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.
	Patterns in the natural and human designed world can be observed.
2-PS1-4	Science searches for cause and effect relationships to explain natural events.
	Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.
	Events have causes that generate observable patterns.
4-PS3-1	Use evidence (e.g., measurements, observations, patterns) to construct an explanation.
	The faster a given object is moving, the more energy it possesses
	Energy can be transferred in various ways and between objects.
4-PS3-2	Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
	Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
	Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.
	Light also transfers energy from place to place.
	Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.
	Energy can be transferred in various ways and between objects.
4-PS3-3	Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
	Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
	Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.
	When objects collide, the contact forces transfer energy so as to change the objects' motions.
	Energy can be transferred in various ways and between objects.

Related Common Core ELA Standards	
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1) (2-PS1-4) (4-PS3-1)
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (2-PS1-4) (4-PS3-1)
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (4-ESS2-2)
RI.3.8	Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (2-PS1-4)
RI.3.9	Compare and contrast the most important points and key details presented in two texts on the same topic. (4-PS3-1)
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. (2-PS1-4)
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)
W.3.7	Conduct short research projects that build knowledge about a topic. (3-PS2-1) (2-PS1-1) (4-PS3-2) (4-PS3-3)
W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-PS2-1) (2-PS1-1) (4-PS3-1) (4-PS3-2) (4-PS3-3)
Related Common Core Mathematics Standards	
MP.2	Reason abstractly and quantitatively. (3-PS2-1) (2-PS1-1)
MP.4	Model with mathematics. (2-PS1-1)
MP.5	Use appropriate tools strategically (3-PS2-1)
3.MD.A.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[1] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-PS2-1)
2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems[1] using information presented in a bar graph. (2-PS1-1)

Unit Essential Questions	**Unit Enduring Understandings**
• ***What is matter?***	• **Scientific inquiry involves asking scientifically oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations**
• ***What are states of matter?***	• **Safety first!**
• ***How is matter measured?***	• **Mathematics is a tool used to model objects, events,**
• ***What are some forms of energy?***	
• ***How does energy change form?***	
• ***How do light and matter react?***	

• ***What are heat and light energy?*** • ***What is sound energy?*** • ***What is electrical energy?*** • ***What is motion?*** • ***How does force affect motion?*** • ***What is gravity?***	**and relationships in the natural and designed world** • **Thinking systematically means looking for the relationships between parts.** • **Energy takes many forms** • **The same basic rules govern the motion of all bodies, from planets and stars to birds and billiard balls.** • **These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy).**

Unit Learning Targets
Students will be Able To:

- understand what matter is
- identify some properties of matter
- identify the three states of matter
- describe how water changes states
- understand how to measure and compare properties of matter
- identify the forms energy takes
- explain that energy causes motion and creates change
- explain that energy can change into many forms
- describe how light is reflected, refracted, and absorbed
- demonstrate how light forms shadows
- explain how heat and light energy affect matter and how heat and light can be produced
- explain how different vibrations result in different sounds
- explain how electricity moves through circuits
- identify some materials that conduct electricity
- describe how things change position when they move
- identify the pushes and pull that affect motion
- demonstrate that gravity is a force that can be overcome.

Unit Vocabulary:

- **Chapter 8:** ***boil, condensation, evaporation, freeze, hardness, mass, matter, melt, property, states of matter, texture, volume***
- **Chapter 9:** ***absorb, closed circuit, electrical energy, energy, kinetic energy, light energy, open circuit, pitch, potential energy, reflect, refract, sound energy, thermal energy, volume, wave***
- **Chapter 10:** ***force, friction, gravity, magnetism, motion, position, speed***

Evidence of Learning

Summative Assessments at the end of each chapter.

Equipment needed: See teacher's edition

Teacher Resources: Pearson Interactive Science
https://www.pearsonsuccessnet.com/snpapp/login/PsnLandingPage.jsp?showLandingPage=true&ticket=ST-

1368125-E9Ki92wc0g5CVII9xxk5-b3-rumba-prod-01-01

Formative Assessments

- teacher observation
- student responses to questions
- student participation in inquiry activities
- student interactive science journal
-
-

Lesson Plans

Chapter 8: *Matter*	Timeframe
Lesson 1 *What is Matter?*	**3-4 class periods**
Lesson 2 *What Are States of Matter?*	**3-4 class periods**
Lesson 3 *How is Matter Measured?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can you classify objects?***
- ***Does the method you use to measure affect your results?***
- ***How can you find the volume of an irregular solid?***
- **Lightning Lab: *Float or Sink***
- ***What makes water change states?***
- **At-Home Lab: *Change of States***
- ***How can mass and volume be measured?***
- **Lightning Lab: *Volume and Mass***

Chapter 9: *Energy and Its Forms*	Timeframe
Lesson 1 *What are some forms of energy?*	**3-4 class periods**
Lesson 2 *How does energy change form?*	**3-4 class periods**
Lesson 3 *How do light and matter interact?*	**3-4 class periods**
Lesson 4 *What are heat and light energy?*	**3-4 class periods**
Lesson 5 *What is sound energy?*	**3-4 class periods**
Lesson 6 *What is electrical energy?*	**3-4 class periods**

Inquiry Questions and Labs:

- ***How can energy of motion change?***
- ***How does heat cause motion?***
- **At-Home Lab: *Make Motion***

- ***How can sound energy change force?***
- **Go Green: Reduce Energy Usage**
- ***What happens when light is reflected in many directions?***
- **At-Home Lab: *Make Shadows***
- **Lightning Lab: *Heat and Colors***
- ***What can affect the sound made by a rubber band?***
- **Lightning Lab: *Change Vibrations, Change Sounds***
- ***How can you control electrical energy?***
- **Go Green: *Electricity Budget***

Chapter 10: *Forces and Motion*	**Timeframe**
Lesson 1 *What is motion?*	**3-4 class periods**
Lesson 2 *How does force affect motion?*	**3-4 class periods**
Lesson 3 *What is gravity?*	**3-4 class periods**

Inquiry Questions and Labs

- ***What can a magnetic force move?***
- ***How can you describe motion?***
- ***How might a steeper chute affect the travel times of a ball?***
- **At-Home Lab: *Observe and Describe Motion***
- ***How does mass affect motion?***
- **Lightning Lab: *Varying Mass and Force***
- ***How does gravity pull an object?***
- **Lightning Lab: *Overcoming Gravity***

Teacher Notes:

Curriculum Development Resources

Click the links below to access additional resources used to design this unit:

- **Next Generation Science Standards (NGSS)** http://www.nextgenscience.org/
- **21st Century Skills** http://www.p21.org/our-work/p21-framework
- **New Jersey Standards Clarification Project** http://www.nj.gov/education/aps/njscp/Phase1allAreas.pdf

Matter: Lesson 1							
Content Area: Science							
Lesson Title: *What is Matter?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	X	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • understand what matter is • identify some properties of matter	**Lesson Sequence** 1. **Engage:** a. Students describe objects using physical properties b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Fun Fact*** 3. **Explain**: a. Review the lesson question. b. Students read *Matter Everywhere* and *Properties of Matter* and then answer questions incorporating reading skills. 4. **Lightning Lab: *Float or Sink*** a. Students classify in a chart whether ten objects sink or float. 5. **Elaborate**: a. **Science Notebook**. Students make a chart to record information about the properties of a classroom object and then write a

	descriptive paragraph about the object. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Matter: Lesson 2							
Content Area: Science							
Lesson Title: *What Are States of Matter?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	X	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies

Students Will Be Able To:

- identify the three states of matter
- describe how water changes states

Lesson Sequence

1. **Engage:**
   a. Students infer what the black rock around the flowing lava in the photograph is.
   b. Introduce lesson vocabulary.
2. **Explore It!** ***What makes water change states?***
3. **Explain**:
   a. Review the lesson question.
   b. Students read *States of Matter* and *Changes in Water* and then answer questions incorporating reading skills.
4. **At-Home Lab:** ***Change of States***
   a. Students fill two cups with the same amount of water, place on cup in the freezer and the other on a shelf. Observe the changes that occur over a three-hour period.
5. **Elaborate**:
   a. **Science Notebook**. Students develop a graphic organizer to detail the steps involved in changing a small piece of ice into water vapor.
6. **Evaluate**:
   a. Review lesson vocabulary
   b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are

- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Matter: Lesson 3							
Content Area: Science							
Lesson Title: *How is Matter Measured?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • understand how to measure and compare properties of matter	**Lesson Sequence** 1. **Engage:** a. Students describe the tools they would use to measure the art supplies. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can mass and volume be measured?*** 3. **Explain**: a. Review the lesson question. b. Students read *Measure Length*, *Measure and Compare Volume*, *Measure and Compare Mass*, and *Measure and Compare Temperature* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Volume and Mass*** a. Students fill one balloon with sand and a second balloon with an equal volume of water and compare the mass of each balloon. 5. **Math Connection:**

	a. Students use a chart to solve word problems in which they compare the masses of different objects. 6. **Elaborate**: a. **Science Notebook**. Students measure the volume of small objects using the water displacement method and record and draw pictures of their results. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Energy and Its Forms: Lesson 1							
Content Area: Science							
Lesson Title: *What Are Some Forms of Energy?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • identify the forms energy takes • explain that energy causes motion and creates change	**Lesson Sequence** 1. **Engage:** a. Students identify energy in a photograph. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Let's Blog*** 3. **Explain**: a. Review the lesson question. b. Students read *Energy*, *Energy at Home*, *Stored Energy*, and *Energy of Motion* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Make Motion*** a. Students identify relative amounts of potential energy exhibited by a ball. 5. **Elaborate**: a. **Science Notebook**. Students identify objects that use energy and the type of energy they use in a room at school. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Energy and Its Forms: Lesson 2							
Content Area: Science							
Lesson Title: *How Does Energy Change Form?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain that energy can change into many forms	**Lesson Sequence** 1. **Engage:** a. Students describe how they think an electric train's energy changes form as it travels. b. Introduce lesson vocabulary. 2. **Explore It! *How can sound energy change form?*** 3. **Explain**: a. Review the lesson question. b. Students read *Changing Forms of Energy, Using Energy, How Energy Travels,* and *Waves* and then answer questions incorporating reading skills. 4. **Go Green: *Reduce Energy Usage*** a. Students list ways that people use gasoline and think of three ways that people could reduce their gasoline usage. 5. **Math Connection:**

	a. Students use division to solve word problems about the energy applied in the game of bowling. 6. **Elaborate**: a. **Science Notebook**. Students choose their favorite sport and describe it in terms of energy transfer. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Energy and Its Forms: Lesson 3							
Content Area: Science							
Lesson Title: *How Do Light and Matter Interact?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how light is reflected, refracted, and absorbed • demonstrate how light forms shadows	**Lesson Sequence** 1. **Engage:** a. Students tell where they think the light shining through the sea jellies comes from. b. Introduce lesson vocabulary. 2. **Explore It!** ***What happens when light is reflected in many directions?*** 3. **Explain**: a. Review the lesson question. b. Students read *Path of Light, How Light Changes, Light and Objects,* and *Shadows* and then answer questions incorporating reading skills. 4. **At-Home Lab:** ***Make Shadows*** a. Students use their hands to make and alter shadows. 5. **Elaborate**: a. **Science Notebook**. Students explain how light makes their favorite fruit appear a particular color. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Energy and Its Forms: Lesson 4							
Content Area: Science							
Lesson Title: *What Are Heat and Light Energy?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how heat and light energy affect matter and how heat and light can be produced	**Lesson Sequence** 1. **Engage:** a. Students study the photograph and explain how they think the light affects the picture. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Misconception*** 3. **Explain**: a. Review the lesson question. b. Students read *Thermal Energy and Heat* and *Heat and Light* and then answer questions incorporating reading skills. 4. **Lightning Lab: *Heat and Colors*** a. Students place a sheet of white paper and a sheet of black paper in a sunny place and compare how light and dark colors are affected by sunlight. 5. **Elaborate**:

	a. **Science Notebook**. Students research and write about how people heated their homes before the use of electricity, natural gas, and solar panels. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Energy and Its Forms: Lesson 5							
Content Area: Science							
Lesson Title: *What is Sound Energy?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how different vibrations result in different sounds	**Lesson Sequence** 1. **Engage:** a. Students write words to describe the sounds the party blower makes. b. Introduce lesson vocabulary. 2. **Explore It!** ***What can affect the sound made by a rubber band?*** 3. **Explain**: a. Review the lesson question. b. Students read *Sound, How Sound Travels, Volume,* and *Pitch* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Change Vibrations, Change Sounds*** a. Students share their observations about what they feel when they rest their fingers on their throat and talk loudly and softly. 5. **Elaborate**: a. **Science Notebook**. Students create a two-column chart about loud sounds and soft sounds. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Energy and Its Forms: Lesson 6							
Content Area: Science							
Lesson Title: *What is Electrical Energy?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • explain how electricity moves through circuits • identify some materials that conduct electricity	**Lesson Sequence** 1. **Engage:** a. Students circle two examples of electrical energy in the picture. b. Introduce lesson vocabulary. 2. **Explore It!** ***How can you control electrical energy?*** 3. **Explain**: a. Review the lesson question. b. Students read *Electric Charges, Electric Currents and Circuits, Closed Circuits and Open Circuits,* and *Conductors and Insulators* and then answer questions incorporating reading skills. 4. **Go Green:** ***Electricity Budget*** a. Students share five ways they use electricity in their home and note ways to conserve energy. 5. **Elaborate**:

	a. **Science Notebook**. Students write a paragraph explaining the path electric current takes in a flashlight. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Forces and Motion: Lesson 1							
Content Area: Science							
Lesson Title: *What is Motion?*						**Timeframe:** 3-4 class periods	
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • describe how things change position when they move	**Lesson Sequence** 1. **Engage:** a. Students discuss examples of their drawings of paths from their classroom to the cafeteria. b. Introduce lesson vocabulary. 2. **Explore: My Planet Diary *Voices from History*** 3. **Explain**: a. Review the lesson question. b. Students read *When Objects Move, An Objects Position, Positions of Moving Objects*, and *How Fast Objects Move* and then answer questions incorporating reading skills. 4. **At-Home Lab: *Observe and Describe Motion*** a. Students share their observations about the movement of an object's shadow over time. 5. **Math Connection: *Find an Object's Speed*** a. Students use the formula for speed to find how fast three runners ran. 6. **Elaborate**: a. **Science Notebook**. Students draw and label a map and write directions from their home to school. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

Forces and Motion: Lesson 2							
Content Area: Science							
Lesson Title: *How Does Force Affect Motion?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • identify the pushes and pulls that affect motion	**Lesson Sequence** 1. **Engage:** a. Students discuss the way they think the dog's leash will move. b. Introduce lesson vocabulary. 2. **Explore It!** ***How does mass affect motion?*** 3. **Explain**: a. Review the lesson question. b. Students read *Causes of Motion*, *Effects of Mass and Friction*, *Motion and Combined Forces* and *Magnetism* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Varying Mass and Force*** a. Students share their observations on mass and force after pushing an empty bin and a bin full of books. 5. **Elaborate**:

	a. **Science Notebook**. Students write an example of how friction slows a moving object down. 6. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.

Differentiation:
Embedded in the program are
- strategies for English Language Learners
- leveled readers
- resources to address multiple intelligences

Resources Provided: *Pearson Interactive Science*

Forces and Motion: Lesson 3							
Content Area: Science							
Lesson Title: *What is Gravity?*					**Timeframe:** 3-4 class periods		
Lesson Components							
***21st Century Themes**							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
***21st Century Skills**							
x	Creativity and Innovation	X	Critical Thinking and Problem Solving	x	Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy	x	Life and Career Skills		
***Interdisciplinary Connections: see unit overview**							
***Integration of Technology: Pearson Interactive Science Program**							
***Equipment needed: see teacher's edition**							
***Vocabulary: see unit overview for all vocabulary associated with this unit**							

Learning Outcomes	Learning Activities/Instructional Strategies
Students Will Be Able To: • demonstrate that gravity is a force that can be overcome	**Lesson Sequence** 1. **Engage:** a. Students explain why skydivers fall back to Earth. b. Introduce lesson vocabulary. 2. **Explore It!** ***How does gravity pull an object?*** 3. **Explain**: a. Review the lesson question. b. Students read *Law of Gravity* and *Gravity and Weight* and then answer questions incorporating reading skills. 4. **Lightning Lab:** ***Overcoming Gravity*** a. Students drop objects of different weights to observe the effects of gravity on the objects. 5. **Math Connection:** a. Students use multiplication to find out what the weight of objects on the moon and Mars would be on Earth. 6. **Elaborate**: a. **Science Notebook**. Students research the effects of low gravity that astronauts must deal with in space and write a summary of their findings. 7. **Evaluate**: a. Review lesson vocabulary b. Formative Assessment: Students complete the Lesson Check blackline master to determine whether they need additional help with lesson content.
Differentiation: Embedded in the program are • strategies for English Language Learners • leveled readers • resources to address multiple intelligences	
Resources Provided: *Pearson Interactive Science*	

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	**Strongly**	**Moderately**	**Weakly**
Are challenging and require higher order thinking and problem solving skills			
Allow for student choice			
Provide scaffolding for acquiring targeted knowledge/skills			
Integrate global perspectives			
Integrate 21st century skills			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills			
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills			
Are varied to address different student learning styles and preferences			
Are differentiated based on student needs			
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives			
Provide opportunities for student reflection and self-assessment			
Provide data to inform and adjust instruction to better meet the varying needs of learners			

Created for New Jersey school districts through a project of the New Jersey Department of Education, Office of Academic Standards, in partnership with the N.J Association for Supervision and Curriculum Development and the N.J. Principals and Supervisors Association.

Wandell School Science Curricula

Aligned to the Next Generation Science Standards (NGSS)

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Content Area:	
Course Title:	**Grade Level:**

Unit Plan 1	**Pacing Guide**
Unit Plan 1	**Pacing Guide**
Unit Plan 3	**Pacing Guide**
Unit Plan 4	**Pacing Guide**
Unit Plan 5	**Pacing Guide**
Unit Plan 6	**Pacing Guide**

Date Created:
Board Approved on:

Created for New Jersey school districts through a project of the New Jersey Department of Education, Office of Academic Standards, in partnership with the N.J Association for Supervision and Curriculum Development and the N.J. Principals and Supervisors Association.