



Washington Township School District



“The mission of the Washington Township Public Schools is to provide a safe, positive, and progressive environment that provides opportunity for all students to attain the knowledge and skills specified in the New Jersey Student Learning Standards at all grade levels, as to ensure their full participation in an ever-changing world as responsible, self-directed, and civic-minded citizens.”

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| Course Title: | Science | | | | | | | | | | | | |
| Grade Level(s): | 5 | | | | | | | | | | | | |
| Duration: | <i>Full Year:</i> | X | <i>Semester:</i> | | <i>Marking Period:</i> | | | | | | | | |
| Course Description: | <p>The Washington Township School District fifth grade curriculum uses an integrated approach to general science that focuses on units in physical, life, and earth science. By using this approach, teachers are able to meet the needs of all students while aligning with the New Jersey Model Curriculum, New Jersey Student Learning Standards, and the Next Generation Science Standards. Hands-on activities are stressed and include student discovery experiments, problem solving, model building, cooperative learning, technology integration, classroom discussion, teacher demonstrations, and writing opportunities for research and self-expression. Interdisciplinary subject areas are incorporated whenever possible. Students are introduced to the use of scientific tools and methods used for investigations. The course is designed to be implemented using the 5E Model of Instruction: Engage, Explore, Explain, Extend/Elaborate, and Evaluate. The major topics of study for fifth grade are taken specifically from the Next Generation Science Standards:</p> <ul style="list-style-type: none"> • Structure and Properties of Matter • Matter and Energy in Organisms and Ecosystems • Earth's Systems • Space Systems: Stars and the Solar System • Engineering Design | | | | | | | | | | | | |
| Grading Procedures: | Grading Weights/Categories <table style="width: 100%; margin-top: 10px;"> <tr> <td style="text-align: left;">Summative Assessment</td> <td style="text-align: right;">40%</td> </tr> <tr> <td style="text-align: left;">Formative Assessment</td> <td style="text-align: right;">30%</td> </tr> <tr> <td style="text-align: left;">Supportive/Classwork</td> <td style="text-align: right;">20%</td> </tr> <tr> <td style="text-align: left;">Supplemental</td> <td style="text-align: right;">10%</td> </tr> </table> | | | | | Summative Assessment | 40% | Formative Assessment | 30% | Supportive/Classwork | 20% | Supplemental | 10% |
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| Primary Resources: | National Geographic Learning/Cengage Learning <u><i>Exploring Science</i></u> | | | | | | | | | | | | |

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

Designed by: Therese Colligan and Janine Ryan

Under the Direction of: Linda Thomas

Written: August, 2017

Revised: _____

BOE Approval: _____

Unit Title: UNIT 1: Physical Science: Structure and Properties of Matter

Unit Description: Students will be introduced to Matter. They will explore states of matter as well as characteristics of each state of matter. Additionally, students will study how matter can change and what causes those changes. Through the activities and investigations listed they will understand that matter has always existed and will always exist in one form or another and be able to identify those materials.

Unit Duration: 16.5 hours – One marking period

Desired Results

Standard(s): Students who demonstrate understanding can:

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| 5-PS1-1. | Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.] |
| 5-PS1-2. | Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.] |
| 5-PS1-3. | Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.] |
| 5-PS1-4. | Conduct an investigation to determine whether the mixing of two or more substances results in new substances. |

Indicators:

PS1.A: Structure and Properties of Matter

PS1.B: Chemical Reactions

Understandings:

Students will understand that...

- Matter has mass and takes up space
- Matter consists of particles too small to be seen
- Matter can exist in three states (quiz)
- Matter has 7 physical properties used for identification
 - Hardness
 - Magnetism
 - electrical conductivity
 - thermal conductivity
 - solubility
 - heating
 - cooling
- Matter is conserved regardless of change in physical state such as a mixture or solution OR when changing from gas, liquid, and solid.
- Matter can undergo a chemical change which is different than a physical change
- Matter is conserved during a chemical change
- Matter can be identified based on physical and chemical properties
- Real scientists use these principles to identify materials

Essential Questions:

- What is mass?
- What is matter?
- How are the states of matter different?
- How can 7 physical states of matter be used in identifying matter?
- What are the characteristics of the 7 physical properties of matter?
- How do scientists use the 7 physical properties of matter to identify matter?
- How does matter change states and conserve?
- What is a mixture?
- What is a solution?
- What is the difference between a chemical change and chemical reaction?
- What causes chemical changes in matter?
- How can we use physical and chemical properties to identify various types of matter?

Assessment Evidence

Performance Tasks:

Investigate Lessons – Students will practice performance tasks in cooperative groups engaging in scientific inquiry.

- Lesson 3 (page 8) Investigate matter- Infer that a solution contains particles too small to be seen
- Lesson 7 (page 16) Investigate Hardness- Determine the hardness of minerals by performing scratch tests
- Lesson 10 (page 22) Investigate Electrical Conductivity- Identify materials that conduct and do not conduct electricity
- Lesson 12 (page 26) Investigate Solubility- Determine the solubility in water of various materials
- Lesson 15 (page 32) Investigate Changing States of Water-1. Determine whether matter is conserved during a change of state. 2. Describe changes in the physical properties of matter that occur during changes in state
- Lesson 16 (page 34) Investigate Mixtures- Determine whether matter is conserved when one material is mixed with another material
- Lesson 20 (page 42) Investigate Chemical Reactions- Demonstrate that matter is conserved though changed during chemical reactions
Think like a Scientist- Students will develop a model, provide evidence, & identify materials cooperatively using science inquiry, providing evidence, analyzing data and drawing conclusions. All information will be recorded in Interactive Science Notebook and evaluated based on Teacher and Student Rubrics.
- Lesson 4 (page 10) Students will be able to develop a model to describe that matter is made of particles too small to be seen; construct and test a model; evaluate the validity of a model; use a model to successfully communicate a concept
- Lesson 17 (page 36) Students will be able to provide evidence that supports the laws of conservation of matter; plan and conduct an investigation; organize, analyze, and interpret data; express a scientific generalization
- Lesson 21 (page 44) Students will be able to distinguish materials based on an analysis of their physical and chemical properties

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook
- Science In a Snap (Lesson 6,8,11)
- Research Scientist (Lesson 22)
- Quizzes
- Unit Test

Benchmarks: Benchmarks will be administered twice during the school year (at the end of Marking Period 2 and 4). The benchmark at the end of Marking Period 2 will include concepts from Physical and Life Science. The benchmark at the end of Marking Period 4 will include concepts from Earth Science.

Learning Plan

Learning Activities:

| Lesson and Duration | Activities | Supplemental Materials |
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| <p>Lesson 1 (TG pg. 4-5) Define & Describe Matter</p> <p>NJSLS PS1.A Matter of any type can be subdivided into particles that are too small to see, but even the the matter still exists and can be detected by other means</p> <p>Objective: Students will be able to define matter as having mass and taking up space AND describe matter and consisting of particles.</p> <p>1 Day</p> | <p>Engage: Students identify matter encountered that day</p> <p>Explore: Preview, probe, observe and read pages 4-5.</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define matter as having mass and taking up space. • Describe Matter as consisting of particles. <p>Elaborate:</p> <ul style="list-style-type: none"> • In interactive science notebook (INTERACTIVE SCIENCE NOTEBOOK) students will make a claim or hypothesize and describe a simple investigation to show if matter can still be identified when broken down into small pieces. • In INTERACTIVE SCIENCE NOTEBOOK students can research and discuss the difference of mass and weight. Example: An astronaut in space weighs less than on earth. Why? <p>Evaluate: "Wrap it Up!"</p> <ul style="list-style-type: none"> • Define in Interactive Science Notebook: What is matter? • Infer: Do sand particles have mass? Explain | <p>Interactive Science Notebook Access to library materials Access to internet</p> |
| <p>Lesson 2 (TG pages 6-7)</p> <p>NJSLS PS1.A Matter of any type can be subdivided into particles that are too small to see, but even the the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving feely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.</p> <p>Objective: Students will be able to compare and contrast the properties of solids, liquids, and gases.</p> <p>1 Day</p> | <p>Engage: Students discuss how water in different containers is the same and/or different.</p> <p>Explore: Preview page 6, discuss how solids, liquids and gases are different from one another, and read pages 6-7.</p> <p>Explain: Solids have particles close together; liquids have particles a little farther apart; gas particles move quickly and are farther apart.</p> <p>Investigate properties in "Science in a Snap"</p> <p>Elaborate: Discuss what evidence supports ideas that a particular kind of matter can exist in more than one state.</p> <p>Evaluate: "Wrap it Up!" In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • List three physical states of matter • Classify examples as solids, liquids, and gases and explain each. <p>Apply information by explaining if honey is a gas, liquid, or solid and why.</p> | <p>Interactive Science Notebook (INTERACTIVE SCIENCE NOTEBOOK) Balloons String Safety Goggles</p> |
| <p>Lesson 3 (TG pages 8-9)</p> <p>NJSLS PS1.A Matter of any type can be subdivided into particles too small to see, but even the matter still exists and can be detected by other means.</p> | <p>Engage: Students describe examples of evaporation they have experienced and what would the case be if a solid was left behind?</p> <p>Explore: Students execute investigation recording claims, evidence & data, and</p> | <p>Interactive Science Notebook (INTERACTIVE SCIENCE NOTEBOOK) Salt Plastic Cup – about 9 oz. Water Plastic Teaspoon</p> |

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| <p>Objective: Students will be able to infer that a solution contains particles too small to see.</p> <p>1 Day</p> | <p>conclusions in chart in INTERACTIVE SCIENCE NOTEBOOK.</p> <p>Explain: Students SHARE observations and conclusions with the group and in INTERACTIVE SCIENCE NOTEBOOK explain what they "think" happened to the crystals of salt when they dissolved.</p> <p>Elaborate: Discuss how temperature might affect the rate at which salt dissolves in water; how stirring might affect it; & how less salt would affect it. How can we test this?</p> <p>Evaluate: "Wrap it Up!" In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> Describe what you observed on the paper after the water evaporated. <p>Explain how your results provide evidence that matter is made of particles too small to be seen.</p> | <p>Dropper Black Construction Paper Hand lens</p> |
| <p>Lesson 4(TG pg10-11)</p> <p>NJSLS 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.</p> <p>Objective: Students will be able to develop a model to describe the matter is made of particles too small to be seen; construct and test a model, evaluate the validity of a model, and use a model to successfully communicate a concept.</p> <p>2 Days Day 1- Prepare and develop concept Day 2- Construct and evaluate</p> | <p>Engage: Review ideas presented on pages 4-9. Ask, "How can you develop a model to explain that matter is made of particles too small to be seen?" Record and answer in Interactive Science Notebook.</p> <p>Explore: Students will create the model, investigate, devise methods of collecting data, and draw conclusions. Then students can develop questions to ask each other such as:</p> <ul style="list-style-type: none"> Does air contain particles? Are some too small to be seen? <p>Create a table showing numbers of students who get it and who did not. If time, students can modify the model.</p> <p>Explain: Students will analyze results and revise the model. Students will share the model.</p> <p>Elaborate: Conduct internet searches on key terms such as atoms, solutions to chemistry, states of matter, etc and use images to depict matter and identify why some are better than others.</p> <p>Evaluate: In INTERACTIVE SCIENCE NOTEBOOK:</p> <ul style="list-style-type: none"> Define Model Identify what type of model was used to describe that matter is made up of particles too small to be seen and explain. Summarize what type of matter was represented in the model. <p>Students will use rubrics to evaluate the model provided on PP. 11b</p> | <p>Interactive Science Notebook (INTERACTIVE SCIENCE NOTEBOOK)</p> <p>Variety of 2-3 dimensional materials such as: paper, poster board, foam, foil, clay, snap blocks, chenille stems, craft sticks, and any others that can be used for modeling</p> |
| <p>Lesson 5(TG pg. 12-13)</p> <p>NJSLS PS1.A Measurements of a variety of properties can be used to identify materials</p> | <p>Engage: Tap into prior knowledge by asking class about objects they've encountered and categorizing how they would identify them.</p> <p>Explore: Preview pp. 12-13 and have students explain what the pictures and captions describe. Explore matter by discussing if all</p> | <p>Interactive Science Notebook (INTERACTIVE SCIENCE NOTEBOOK)</p> |

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| <p>Objective: Students will be able to identify seven physical properties of matter.</p> <p>1 day</p> | <p>types have the same properties. Set a purpose and read pp. 12-13</p> <p>Explain: Define "Physical Properties." Identify and discuss which involve an attraction or change.</p> <p>Elaborate: Extend thinking about properties of matter.</p> <p>Evaluate: "Wrap it Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> List 6 physical properties that can be used to identify matter. <p>Apply by choosing an object in students' surroundings and describe physical properties.</p> | |
| <p>Lesson 6 (TG pg. 14-15)</p> <p>NJSLS PS1-A (5-PS1-3) Measurements of a variety of properties can be used to identify materials.</p> <p>Objective: Students will be able to describe hardness and order the degrees of hardness of various materials.</p> <p>1 day</p> | <p>Engage: Ask students to list a variety of materials they have encountered and order them softest to hardest and ask how they determined that.</p> <p>Explore: Preview pp. 14-15 and ask them to identify what's in the picture. What can you tell about the relative hardness of chalk vs. Concrete? Ask probing questions, give background on pyrite and gold, set a purpose and read pages 14-15.</p> <p>Explain: Differentiate between substances of different hardness and how you can tell. "Science in a Snap."</p> <p>Elaborate: Research more about hardness and how it can be used to manufacture materials in various industries.</p> <p>Evaluate: "Wrap it Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> How can the property of hardness be tested? Explain how it works. Your fingernail is harder than chalk. Would chalk scratch your fingernail or would your fingernail scratch chalk? | <p>Plastic spoon Aluminum washer Copper Penny Steel paper clip Rubber Band Orange crayon Interactive Science Notebook Chart/ data table Access to internet</p> |
| <p>Lesson 7 (TG pg 16-17)</p> <p>NJSLS 5-PS1-3 Make observations and measurements to identify materials based on their properties</p> <p>Objective: Students will be able to determine the hardness order of minerals by performing scratch tests</p> <p>2 days</p> | <p>Engage: Students will recall events at home when something was scratched and identify what this indicated regarding relative hardness of the object.</p> <p>Explore: Lead cooperative groups through the "Investigate" on pages 16-17. Have students create a chart in INTERACTIVE SCIENCE NOTEBOOK to record their findings and refer to later to analyze and draw conclusions.</p> <p>Explain: Discuss evidence found that helped students order objects from softest to hardest. Ask students to identify the principle they used.</p> <p>Elaborate: Facilitate a discussion about hardness and materials used to make common items at home. Ask why the hardness of the material is an important consideration for engineers and manufacturers. Discuss.</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> Put mineral samples in order from softest to hardest and list in Interactive Science Notebook. What evidence was gathered to determine this order? Where would gold and pyrite fit in your order since gold is slightly harder than | <p>4 different minerals labeled: calcite, quartz, talc & feldspar Iron nail Copper penny Hand lens Data table/ chart Interactive Science Notebook (INTERACTIVE SCIENCE NOTEBOOK) Safety goggles</p> |

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| | a fingernail and pyrite is harder than the nail. | |
| <p>Lesson 8 (TG pg 18-19)</p> <p>NJSLS PS1-A (5-PS1-3) Measurement of a variety of properties can be used to identify materials</p> <p>Objective: Students will be able to describe magnetism, identify substances that are attracted to a magnet and explain how the property of magnetism can be tested.</p> | <p>Engage: Inquire as to the experience students have regarding magnets and what they may be attracted to.</p> <p>Explore: Review pp. 18-19 and ask what's happening to the train in the picture. Ask probing questions, set a purpose and read pp. 18-19.</p> <p>Explain: Students will identify to what magnets are and are not attracted and be able to explain the "pull / push" forces. "Science in a Snap."</p> <p>Elaborate: Discuss the advantage of using magnetism to lift and move the train in the picture. Have students research maglev trains and other machines using magnets.</p> <p>Evaluate: "Wrap It Up! In Interactive Science Notebook</p> <ul style="list-style-type: none"> • Provide examples of something magnetic and identify what kind of metal it most likely contains. • How can the property of magnetism be tested? | <p>Eraser Iron Steel Nail Paper Clip Iron or Steel washer Penny Glass marble Bar magnet Access to internet Interactive Science Notebook</p> |
| <p>Lesson 9(TG pg 20-21)</p> <p>NJSLS PS1-A (5-PS1-3) Measurements of a variety of properties can be used to identify materials.</p> <p>Objective: Students will be able to classify matter based on its ability to conduct or insulate electrical energy.</p> <p>1 day</p> | <p>Engage: Students are asked to name objects around the classroom that require electricity, describe the cords, and speculate as to what is under the plastic.</p> <p>Explore: Students will preview pp. 20-21 and make a claim about the lesson. How is electricity like a hose? Set a purpose and read pp. 20-21.</p> <p>Explain: Students will recall that matter is particles too small to be seen and define electricity. Students will classify matter based on conductivity.</p> <p>Elaborate: In Interactive Science Notebook, define this statement: Where electrical conductors are found, so are insulators. Discuss and provide examples.</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • What is the difference between an electrical conductor and an electrical insulator? • From what you've learned, what are two different properties of iron? • Explain why electrical gloves are made of rubber. | <p>Interactive Science Notebook Access to internet</p> |
| <p>Lesson 10 (TG pg 22-23)</p> <p>NJSLS PS1-A (5-PS1-3) Measurements of a variety of properties can be used to identify materials.</p> <p>Objective: Students will be able to identify materials that conduct and do not conduct electricity.</p> <p>1 day</p> | <p>Engage: Ask students what happens when you turn on the switch of an unlit lamp at home. Discuss what would happen if the wire were NOT a conductor.</p> <p>Explore: Guide students through the "Investigate" and read pp. 22-23 together.</p> <p>Explain: Help students/ groups make claims/ predictions, gather/record evidence, & draw conclusions.</p> <p>Elaborate: Have students tour the building to find evidence of electrical sources. (It is not always an outlet/ plug), enlist the assistance of the custodian and principal to see the electrical</p> | <p>1 light bulb in holder 1 D cell in holder 2 15 cm. Wire Materials to test such as:</p> <ul style="list-style-type: none"> • Nail • Aluminum foil • Index card • Eraser • Craft stick • Paper clip • Washer • Cork |

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| | <p>panel and have students draw a schematic of the flow of electricity in the building. Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • Did your results support your predictions? EXPLAIN <p>Classify the materials as conductors or insulators.</p> | <ul style="list-style-type: none"> • Plastic button <p>Safety Goggles Interactive Science Notebook Access to internet</p> |
| <p>Lesson 11 (TG pg 24-25)</p> <p>NJSLS PS1-A (5-PS1-3) Measurements of a variety of properties can be used to identify materials</p> <p>Objective: Students will be able to classify matter based on its ability to conduct or insulate thermal energy.</p> <p>1 day</p> | <p>Engage: Ask students to speculate how freshly made hot chocolate would feel on their hands in a ceramic mug versus an insulated vacuum container. Discuss Explore: Preview pp. 24-25 and have students identify the objects and how types of matter "act" differently. Set a purpose and read. Explain: Lead students through "Science in a Snap." Explain thermal energy; contrast thermal conductors and thermal insulators. Elaborate: Find out more about thermal conductors and insulators by having students cooperatively conduct a scavenger hunt to find examples, then categorize them in Interactive Science Notebook. Evaluate: "Wrap It Up!" Interactive Science Notebook</p> <ul style="list-style-type: none"> • What is the difference between a thermal conductor and a thermal insulator? • Identify the following materials as thermal conductors or thermal insulators: wooden spoon, iron frying pan, plastic spatula, steel fork | <p>Metal spoon Plastic spoon Foam or Ceramic cup Interactive Science Notebook Access to internet</p> |
| <p>Lesson 12 (TG pg 26-27)</p> <p>NJSLS PS1.A (5-PS1-3) Measurements of a variety of properties can be used to identify materials</p> <p>Objective: Students will be able to determine the solubility of various materials.</p> <p>1 day</p> | <p>Engage: Have students recall what a bottle of salad dressing looks like unshaken and shaken and compare to a bottle of sweet tea. Both have ingredients, but are different. How? Discuss. Explore: Preview pp. 26-27; Have students construct a table in INTERACTIVE SCIENCE NOTEBOOK to record evidence and data, encourage students to make claims, guide groups through the "Investigate." Explain:</p> <ul style="list-style-type: none"> • Solution- a mixture of two or more substances evenly distributed <p>Help students classify and interpret data and draw conclusions. Elaborate: Have students consider other factors that might impact solubility and investigate further. (stirring, temperature, amount, etc) Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • Did your results support your claim? Explain. • Identify each material used in this investigation as soluble or insoluble in water. | <p>4 identical plastic cups Sand Plastic spoon Sea salt Lemon Juice Vegetable Oil Clock or Stop Watch Safety goggles Warm Tap Water (teacher) Graduated Cylinder (teacher) Interactive Science Notebook, INTERACTIVE SCIENCE NOTEBOOK Access to Internet</p> |
| <p>Lesson 13 (TG pg 28-29)</p> <p>NJSLS PS1-A (5-PS1-2) The amount of matter is conserved</p> | <p>Engage: Ask students to recall instances when they observed the effects of heat on ice cubes and liquid water. Discuss.</p> | <p>Interactive Science Notebook Access to Internet Reproduced table from TM pp. 29</p> |

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| <p>when it changes form, even in transitions in which it seems to vanish.</p> <p>Objective: Students will be able to define and identify the boiling and melting point of water; describe how boiling affects the state of water.</p> <p>1 day</p> | <p>Explore: Preview pp. 28-29 and discuss what they think is happening. Explore heating and read to describe the effect of heating matter.</p> <p>Explain: Define key terms: melting point, boiling point, physical change, and conservation of matter. Explain the effects of heating.</p> <p>Elaborate: Extend students thinking on heating by having students study the table provided. Then, they will identify unknown materials based on the data in the table.</p> <p>Evaluate: "Wrap It Up!" Interactive Science Notebook</p> <ul style="list-style-type: none"> Boiling and melting points are properties of matter. What are the boiling and melting points of water? How does boiling affect water's state of matter? | |
| <p>Lesson 14 (TG pg 30-31)</p> <p>NJSLS PS1.A (5-PS1-2) The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish.</p> <p>Objective: Students will be able to define condensation and describe how cooling of water can change its state.</p> <p>1 day</p> | <p>Engage: Students will recall instances of liquid water appearing to come from nowhere. Where do you suppose it came from?</p> <p>Explore: Preview photo on pp. 30-31- identify state of matter. What changes occurred to cause this? Set a purpose for reading and read pp. 30-31</p> <p>Explain: Explain condensation. Compare and contrast condensation and freezing.</p> <p>Elaborate: Extend thinking about cooling. Think about cooling and cold South Pole. How do mustaches freeze? Why? Think and discuss. What experiences have students had to compare?</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> Define condensation Explain how a window that is not wet can become covered with frost. Make a diagram to show water's three states of matter and its change. Label ice, liquid water, water vapor, condensation, melting, freezing | <p>Interactive Science Notebook</p> |
| <p>Lesson 15 (TG pg 32-33)</p> <p>NJSLS PS1.A (5-PS1-2) The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish</p> <p>Objective: Students will be able to determine whether matter is conserved during a change in state and describe the changes in physical properties of matter that occur during changes in state.</p> <p>1-5 days</p> | <p>Engage: Ask students to consider a bowl of ice cream and what happens if it stands at room temp. Does the amount of matter change?</p> <p>Explore: Guide students through the investigation on pp. 32-33.</p> <p>Explain: What happens to:</p> <ul style="list-style-type: none"> Liquid when it cools to below freezing point Ice when heated above freezing point <p>Describe evidence to support findings</p> <p>Elaborate: How could one design an investigation to show that water hasn't really vanished, but changed state. Discuss or write in Interactive Science Notebook.</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> Did your results support your claim? Which properties of water stayed the same? Which changed? | <p>Per group:</p> <ul style="list-style-type: none"> 2 resealable plastic sandwich bags Masking tape Graduated cylinder Pitcher of water Balance Gram masses <p>Interactive Science Notebook</p> |

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| | <ul style="list-style-type: none"> • Explain the differences in bags after step 4 • Draw conclusions about your findings demonstrate conservation of matter. | |
| <p>Lesson 16 (TG pages 34-35)</p> <p>NJSLS PS1.A (5-PS1-2) The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish</p> <p>Objective: Students will be able to determine whether matter is conserved when one material is mixed with another material.</p> <p>1 day</p> | <p>Engage: Ask students to recall when they or a family member mixed a solid and liquid and describe it.</p> <p>Explore: Guide students through investigation on pp. 34-35. Students will make predictions and observations.</p> <p>Explain: Share observations and conclusions and refer to page 34 and discuss mixture. How is a solution different from mixture? The same?</p> <p>Elaborate: Suppose 20 g of salt is dissolved in 100 g in a beaker with mass of 200 g. suppose the water evaporates. What is the mass? Explain your answer and how does it support the Law of Conservation of Matter?</p> <p>Evaluate: "Wrap It up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • How did the mass of the material before the baking soda and water were mixed compare to the mass of the materials after they were mixed? • Why was the empty bag added to the balance in step 4? • How did your finding demonstrate the conservation of matter? | <p>Baking Soda Spoon Balance Resealable Bag 8 oz cup Water Gram masses</p> <p>Interactive Science Notebook</p> |
| <p>Lesson 17 (TG pages 36-37 & 36a-37a)</p> <p>NJSLS 5-PS1-2 Measure and graph the quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.</p> <p>Objective: Students will be able to find evidence that supports the Law of Conservation of Matter, plan and conduct an investigation, organize, analyze, and interpret data and express a scientific generalization.</p> <p>2 days</p> | <p>Engage: Set the scene and review pp 36-37. Ask questions then plan and conduct an investigation. Is it reliable & practical? What is the advantage of repeating an investigation?</p> <p>Explore: In science notebook students will create and fill in a table with trials, before and after columns. Convert data into a graph and analyze the data.</p> <p>Explain: Analyze and interpret the data. Did it support the Law of Conservation of Matter? Share your results.</p> <p>Elaborate: Follow up investigation with another but focus on a different physical change and different ways to organize data.</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • Identify the type of data you collected for your graph. • Describe the physical changes you observed. • Explain how you used your data as evidence. | <p>Choose from various liquids and solids such as:</p> <ul style="list-style-type: none"> • Water • Lemon juice • Vegetable oil • Ice • Clay sand • Sugar cubes • Baking soda • Salt • Paper • Etc <p>Interactive Science Notebook</p> |
| <p>Lesson 18 (TG pages 38-39)</p> <p>NJSLS PS1.B (5-PS1-4) When two or more different substances are mixed, a new substance with different properties may be formed.</p> <p>(5-PS1-2) No matter what reaction or change in properties</p> | <p>Engage: Students will recall instances when they observed when one material changed to another. What happens?</p> <p>Explore: Preview pp. 38-39. Explore chemical change by asking probing questions. Have students read to compare and contrast chemical change vs chemical reactions.</p> <p>Explain: Differentiate between chemical change and chemical reaction. Contrast a chemical change with a physical change and</p> | <p>Interactive Science Notebook Access to Internet</p> |

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| <p>occurs, the total weight of the substances does not change.</p> <p>Objective: Define and describe a chemical change; compare and contrast chemical vs. Physical change; distinguish between chemical change and chemical reaction.</p> <p>1 day</p> | <p>then connect chemical reactions to the Conservation of Matter.</p> <p>Elaborate: Find out more about chemical change by directing attention to pp. 39. Have students describe what is shown in the photo and how it is evidence of chemical change. Research chemical change and give other examples.</p> <p>Evaluate: "Wrap It Up!" Interactive Science Notebook</p> <ul style="list-style-type: none"> • Restate what a chemical reaction is. • Compare and contrast how chemical change is the same and different from a physical change. | |
| <p>Lesson 19 (TG pages 40-41)</p> <p>NJSLS PS1-B (5-PS1-4) When two or more different substances are mixed, a new substance with different properties may be formed.</p> <p>(5-PS1-2) No matter what reaction or change in properties occurs, the total weight of the substances does not change.</p> <p>Objective: Student will be able to identify the signs of chemical change</p> <p>1 day</p> | <p>Engage: Remind students of previous lesson and ask what evidence caused them to think a chemical change took place.</p> <p>Explore: Preview pp. 40-41; what is happening? Explore signs of chemical change. Ask students to use their senses to detect other changes. Read pp. 40-41 to describe this change.</p> <p>Explain: Find out more the signs of chemical change by providing scenarios and discussing.</p> <p>Elaborate: Research chemical changes that produce heat that is useful to people and share.</p> <p>Evaluate: "Wrap It Up!" In Interactive Science Notebook</p> <ul style="list-style-type: none"> • Identify 5 signs that a chemical reaction took place. • Identify some chemical reactions that you observe regularly at home. How do you know? | <p>Interactive Science Notebook Access to Internet</p> |
| <p>Lesson 20 (TG pages 42-43 & 42a-43a)</p> <p>NJSLS 5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.</p> <p>Objective: Students will be able to demonstrate that matter is conserved though changed during a chemical reaction.</p> <p>1-2 days</p> | <p>Engage: Refer to previous lesson on chemical changes. Ask probing questions to encourage exploration.</p> <p>Explore: Guide groups through Investigation on pp. 42-43. Students will make predictions and observations and record data on a chart/table.</p> <p>Explain: Students will share their observations and conclusions.</p> <p>Elaborate: Using baking soda and vinegar causes a chemical reaction. How would you use these materials to design an investigation to test the principle of conservation of matter?</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Describe what you observed when you added the tablet to the water. • Infer what evidence shows that a new substance was formed. | <p>Safety goggles Per group: 100 mL graduated cylinder Large resealable plastic bag Balance Water Effervescent tablet Gram masses Interactive Science Notebook</p> |
| <p>Lesson 21 (TG pages 44-45)</p> <p>NJSLS 5-PS1-3 Make observations and measurements to identify materials based on their properties.</p> <p>Objective: Students will be able to distinguish materials based on an</p> | <p>Engage: Set the scene by asking how you could identify contents of a product if the label is worn off. Ask questions and have students read introductory paragraph in step 1. Provide examples.</p> <p>Explore: Students will plan and conduct an investigation by making predictions and recording observations as data. Students should follow steps and analyze results.</p> | <p>Each group: Corn Starch Baking soda Baking powder Water Vinegar Iodine- potassium iodide solution (10 mL) Dropper</p> |

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| <p>analysis of their physical and chemical properties.</p> <p>2 days</p> | <p>Explain: Share results and analyze the information.</p> <p>Elaborate: If the unknown kinds of matter in your investigation were metals, how could you eliminate iron, nickel or cobalt? Explain.</p> <p>Evaluate: Interactive Science Notebook</p> <ul style="list-style-type: none"> • What were the substances you identified? • How do you know? | <p>13 clear 8 oz plastic cups 4 plastic spoons 10 cm x 10 cm squares of foil INTERACTIVE SCIENCE NOTEBOOK Safety goggles</p> |
| <p>Lesson 22 (possible Benchmark)</p> <p>NJSLS Science investigation uses a variety of tools and techniques</p> <p>Objective: Students will be able to identify the goal of research scientist Albert Yu-Min Lin and the tools he employs to reach that goal</p> <p>1 day</p> | <p>Engage: Ask students what they think a research scientist does and what kinds of problems he/ she tries to solve.</p> <p>Explore: Preview pp. 46-47 and ask probing questions. Have students read in order to gain exposure to the career of a research scientist.</p> <p>Explain: Explain what Albert Yu-Min Lin does and describe the tools he uses in his research. Is this a career you would consider? Why or why wouldn't you like to be a research scientist.</p> <p>Elaborate: Research other careers involving scientific research. Students will find out about at least 4 other careers, describe and share and then tell why it would be appealing or not appealing for them</p> <p>Evaluate: In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is Albert Yu-Min Lin trying to locate? • What tools does he use in his research? • Explain crowdsourcing. | <p>INTERACTIVE SCIENCE NOTEBOOK Access to internet</p> |

Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

Standard(s):5- PS1-1

Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

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| 4.0 | <p>Students will be able to: In addition to planning and conducting investigations at 3.0, students can:</p> <ul style="list-style-type: none"> • Define matter and mass • Hypothesize whether breaking down material into smaller and smaller pieces will still be the same material. • Explain their model and show how all things are made of particles too small to be seen |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Plan and conduct investigations to provide evidence that all matter has mass and that all matter is made of particles too small to be seen. • Create a model to show that matter is made of particles too small to be seen |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Define matter • Define mass |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

Standard(s):Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]

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| 4.0 | <p>Students will be able to: In addition to planning and conducting investigations at 3.0, students can</p> <ul style="list-style-type: none"> • Explain how people use their senses to identify properties • Research and explain how hardness can be used in industry by manufacturers • Discuss the importance of the hardness of a material when considering building • Identify advantages of the use of magnets in industry • Explain the relationship between the use of electrical insulators and conductors • Identify and explain various thermal conductors and insulators found in a given location and their relationship to one another. |
| 3.0 | <p>Students will be able to: Conduct investigations to:</p> <ul style="list-style-type: none"> • Determine the hardness order of materials by performing scratch tests • Describe magnetism, identify items that attract and repel, explain how magnetism can be tested • Classify & identify matter based on ability to conduct electricity and heat • Determine the solubility of items in water |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Define property • Define hardness • Define magnetism • Define electrical conductor • Define electrical insulator • Define thermal energy • Define thermal conductor • Define thermal insulator |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

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| <p>Standard(s): Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]</p> | |
| 4.0 | <p>Students will be able to: In addition to planning and investigating at 3.0 can also:</p> <ul style="list-style-type: none"> • Reproduce and study a table and identify an unknown material • Support the idea that exhaled air contains water vapor • Design an investigation that shows that water does not vanish but changes state • Draw conclusion that supports the conservation of matter • Execute planned investigation and analyze data |
| 3.0 | <p>Students will be able to: Plan and conduct investigations to:</p> <ul style="list-style-type: none"> • Identify the boiling and melting points of water and how boiling affects the state of water • Describe how the cooling of water can change its state • Determine whether matter is conserved during a change of state and describe those changes • Determine whether matter is conserved when mixed with other substances • Organize, collect, analyze & interpret data • Identify evidence of chemical change • Demonstrate that matter is conserved despite a chemical change |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Define melting point • Define boiling point • Define physical change • Define conservation of matter • Define condensation • Define condense • Define mixture • Define chemical change • Define chemical reaction |
| 1.0 | <p>With help, partial success at level 2.0 content and level 3.0 content</p> |
| 0.0 | <p>Even with help, no success</p> |

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| <p>Standard(s): Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]</p> | |
| 4.0 | <p>Students will be able to: In addition to planning and investigating at 3.0 can also:</p> <ul style="list-style-type: none"> • Reproduce and study a table and identify an unknown material • Support the idea that exhaled air contains water vapor • Design an investigation that shows that water does not vanish but changes state • Draw conclusion that supports the conservation of matter • Execute planned investigation and analyze data |
| 3.0 | <p>Students will be able to: Plan and conduct investigations to:</p> <ul style="list-style-type: none"> • Identify the boiling and melting points of water and how boiling affects the state of water • Describe how the cooling of water can change its state • Determine whether matter is conserved during a change of state and describe those changes • Determine whether matter is conserved when mixed with other substances • Organize, collect, analyze & interpret data • Identify evidence of chemical change • Demonstrate that matter is conserved despite a chemical change |

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| 2.0 | Students will be able to: <ul style="list-style-type: none"> • Define melting point • Define boiling point • Define physical change • Define conservation of matter • Define condensation • Define condense • Define mixture • Define chemical change • Define chemical reaction |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content |
| 0.0 | Even with help, no success |

Unit Modifications for Special Population Students

Advanced Learners

- Allow students to work independently through Investigations, "Think Like a Scientist", and "Think Like an Engineer" by applying learning to a new situation
- Page 10 Teacher's Guide
 - *Guide students on an internet search using key words such as atoms, solutions chemistry, states of matter, and solar system model.
 - *Have students click on "images" and explain how models are used to explain things or depict things that are too tiny to be seen.
 - *Students then will explain how matter is in fact made of particles too small to be seen, create their own, and in addition, explain a model they've found to be superior to others in explaining this
- Page 17 Teacher's Guide
 - *Facilitate a conversation about building an object
 - *Students will brainstorm, plan, design an object
 - *Student will decide on materials for the object
 - *Students will understand the impact of the materials' hardness and explain why the material is useful OR not useful
 - *Students will prepare a presentation such as Flip Grid, power point, or poster to share with classmates.
- Page 37a Teacher's guide
 - *Lead students into discovering a particular physical change to support the conservation of matter.
 - *Following the investigation, students will brainstorm, and design an additional investigation focusing on different effects of physical change ie: if they studied liquid to solid, perhaps study liquid to gas or gas to solid or solid to liquid.
 - *Students will then share findings in a presentation such as a 3D model, chart, power point, video or poster
- Page 43a Teacher's guide
 - *Provide students with background on a chemical reaction such as when mixing vinegar and baking soda
 - *List the materials above on the board plus a narrow mouth bottle, balance, balloon and gram masses

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| | <p>*Ask: "Using these materials, how would you design an additional investigation to test whether the vinegar & baking soda reaction followed the principle of the conservation of matter?"</p> <p>*Allow time for students to ponder and share their ideas with small groups or the class.</p> |
| Struggling Learners | <ul style="list-style-type: none"> • Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook to use with Investigations, Science in a Snap, Think Like a Scientist, and Think like an Engineer. • Teacher's Guide page 5 <p>*Help students determine main idea</p> <p>*Allow students in small groups to read the opening two paragraphs of the text.</p> <p>*Focus on the word "stuff" with relation to matter and mass</p> <p>*Help them conclude that matter is "stuff" and mass is how much "stuff"</p> <ul style="list-style-type: none"> • Teacher's Guide page 7 <p>*Guide students in using the inset illustrations and captions</p> <p>*Have them summarize the relationship between the characteristics of any space occupied by solids, liquids, and gases as well as the structure and activity of the particles</p> <ul style="list-style-type: none"> • Teacher's Guide page 19 <p>*Focus on the caption, specifically "MagLev" train</p> <p>*Help students determine the meaning based on the words used to create this</p> <p>*Magnetic & Levitate</p> <p>*Lead them in constructing meaning of the word</p> <ul style="list-style-type: none"> • Teacher's Guide page 33 <p>*Have students reread text on page 32</p> <p>*Lead them to extract a quote to support: "Even when water changes from one form to another, its mass is conserved (or stays the same) Some physical properties change, however."</p> <p>*Explain what this means along with the text evidence.</p> <ul style="list-style-type: none"> • Pair with higher ability learners when appropriate • Allow for small groups and mini lessons with teacher • Vary roles in heterogenous groups to allow for different learning styles |
| English Language Learners | <ul style="list-style-type: none"> • Vocabulary: mass, matter, states of matter, gas, solid, liquid, property, hardness, magnetism, electrical conductivity, electrical conductor, electrical insulator, thermal energy, thermal conductor, thermal insulator, melting point, boiling point, physical change, conservation of matter, condensation, condense, mixture, chemical change, and chemical reaction • Teacher's Guide page 31 • Beginner: Ask basic questions for students to provide "yes" or "no" answers • Intermediate: Provide sentence frames to allow ELL students to fill in the correct answers. <ul style="list-style-type: none"> IE: A chemical change ____ occurring if heat is given off. (is) A chemical change ____ occurring if light is produced. (is) • Advanced: Help students complete sentence stems that have multiple items to complete |
| Special Needs Learners | <ul style="list-style-type: none"> • Refer to IEP's for modifications • Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook. • Modify Investigations, Science in a Snap, Think Like a Scientist, and Think Like an Engineer by chunking and shortening expected responses and tasks. • Provide small group instructions • Refer to activities listed for struggling learners above |

Interdisciplinary Connections

Indicators:

ELA-

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS1-1)

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

Mathematics –

MP.2 MP.4 MP.5 5.NBT.A.1

5.NF.B.7 5.MD.A.1

5.MD.C.3 5.MD.C.4

Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)

Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)

Use appropriate tools strategically. (5-PS1-2),(5-PS1-3)

Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-PS1-1)

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)

Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5-PS1-2)

Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

Integration of 21st Century Skills

Indicators:

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Understand and use technology systems.

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

Select and use applications effectively and productively.

- 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue. 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.

- 8.1.2.C.1 Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

- 8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.

Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

- 8.1.5.E.1 Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions

- 8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

The characteristics and scope of technology.

- 8.2.5.A.1 Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
- 8.2.5.A.2 Investigate and present factors that influence the development and function of a product and a system.

The core concepts of technology.

- 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.

The relationships among technologies and the connections between technology and other fields

- 8.2.5.A.4 Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
- 8.2.5.A.5 Identify how improvement in the understanding of materials science impacts

The cultural, social, economic and political effects of technology.

- 8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

The effects of technology on the environment.

- 8.2.5.B.2 Examine systems used for recycling and recommend simplification of the systems and share with product developers.
- 8.2.5.B.3 Investigate ways that various technologies are being developed and used to reduce improper use of resources.

The role of society in the development and use of technology.

- 8.2.5.B.4 Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.B.5 Explain the purpose of intellectual property law.

The attributes of design.

- 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.3 Research how design modifications have lead to new products.

The application of engineering design.

- 8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.C.5 Explain the functions of a system and subsystems.

The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

- 8.2.5.C.6 Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
- 8.2.5.C.7 Work with peers to redesign an existing product for a different purpose.

Apply the design process.

- 8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Use and maintain technological products and systems.

- 8.2.5.D.3 Follow step by step directions to assemble a product or solve a problem.

- 8.2.5.D.4 Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
- 8.2.5.D.5 Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.

Assess the impact of products and systems.

- 8.2.5.D.6 Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
- 8.2.5.D.7 Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment

Unit Title: Unit 2: LIFE SCIENCE: Matter and Energy in Organisms and Ecosystems

Unit Description: Students will explore chemical and physical changes in matter as well as the flow of energy in various systems. Students will identify various systems and how organisms interact with each other as well as inorganic matter.

Unit Duration:

Desired Result

Standard(s): Students who demonstrate understanding can:

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

Indicators:

PS3.D: Energy in Chemical Processes and Everyday Life

- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

LS1.C: Organization for Matter and Energy Flow in Organisms

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)

Understandings:

Students will understand that...

- Plants need energy to grow
- All energy comes from the sun
- Plants need air and water
- Hydroponics can help increase food supply
- Animals need food
- Energy flows through a food chain
- Decomposers break down living organisms
- Matter cycles through an ecosystem
- Organisms need certain conditions to thrive
- Many organisms coexist to make up an ecosystem

Essential Questions:

- What are the three things plants need to live and grow?
- How do plants use energy from the sun?
- What nutrients do plants need?
- How can we use hydroponics?
- What are some conditions that make it difficult to grow food?
- Where does the food animals need come from?
- What is a food chain?
- How does energy transfer?
- What is the role of decomposers in a food chain?
- How is matter cycled through an ecosystem?

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| <ul style="list-style-type: none"> • Organisms interact with other organisms and inorganic elements • Matter moves among plants, animals, decomposers, and the environment • Newly introduced species can disrupt an ecosystem • Conservationists study the natural world | <ul style="list-style-type: none"> • What are the conditions to meet particular needs of an organism within an environment? • How are those needs met? • What are the different levels of organisms in an ecosystem? • How does matter move among plants, animals, decomposers, and the environment? • How can new species disrupt an ecosystem? • How can scientists use another species to control a population of invasive organisms? • What does a conservationist do and why is it important? |
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Assessment Evidence

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| <p>Performance Tasks: Investigate Lessons- Students will practice performance tasks in cooperative groups engaging in scientific inquiry.</p> <ul style="list-style-type: none"> • Lesson 27 (page 60) Investigate Hydroponics- Determine if plants can grow without soil • Lesson 38 (page 82) Investigate Interactions in a model pond- Observe interactions among organisms in an ecosystem and describe the flow of energy <p>Think like a Scientist- Students will develop a model, provide evidence, & identify materials cooperatively using science inquiry, providing evidence, analyzing data and drawing conclusions. All information will be recorded in Interactive Science Notebook and evaluated based on Teacher and Student Rubrics.</p> <ul style="list-style-type: none"> • Lesson 28 (page 62) Support an argument- Use evidence to support that plants get the materials they need for growth from mainly water and air • Lesson 31 (page 68) Compare and Contrast- Use food chains to compare the pathway of energy from the sun through organisms • Lesson 32 (page 70) Use Models- Create a model to show that energy in animals' food was once from the sun. • Lesson 39 (page 84)- Develop a model- Create the model to describe movement of matter among organisms <p>Lesson 41 (page 88) Animals Invade – show how a species can invade an ecosystem and how scientists use other species to control it</p> | <p>Other Evidence: Students will demonstrate their understandings through:</p> <ul style="list-style-type: none"> • Science Notebook • Science In a Snap (Lesson 6,8,11) • Research Scientist (Lesson 22) • Quizzes • Unit Test |
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Benchmarks: Benchmarks will be administered twice during the school year (at the end of Marking Period 2 and 4). The benchmark at the end of Marking Period 2 will include concepts from Physical and Life Science. The benchmark at the end of Marking Period 4 will include concepts from Earth Science.

Learning Plan

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| Learning Activities: | | |
| <p>Lesson 23 (TG page 50-51)</p> <p>NJSLS PS3.D (5-PS3-1)The energy released from food was once energy from the sun that was captured by</p> | <p>Engage: Recall an experience with a houseplant and describe conditions.</p> <p>Explore: Preview the lesson on pp 50-51 discuss. Students will read pp 50-51 to identify what plants need.</p> | <p>Science Notebook</p> <p>Access to additional print resources</p> <p>IE: the library</p> <p>Access to the internet</p> |

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| <p>plants in the chemical process that forms plant matter (from air and water)</p> <p>Objective: Students will be able to list three main things plants need to live and grown and identify the source of energy that plants use to make the food they need to survive.</p> <p>1 day</p> | <p>Explain: Identify what plants needs to live; compare how animals and plants get energy; explain how a specific plant, based on reading, can survive in its environment.</p> <p>Elaborate: Research Epiphytes and be able to tell what they are, where they grow, how they interact with their environment and use energy.</p> <p>Evaluate: "Wrap It Up!" In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Recall the three main things plants need to survive • Identify the source of energy plants need to survive • Summarize how an orchid in the rain forest gets what it needs | |
| <p>Lesson 24 (TG page 52-53)</p> <p>NJSLS PS3.D (5-PS3-1) The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water)</p> <p>Objective: Students will be able to explain that the energy that plants use to live and grow was once energy from the sun and describe the process of photosynthesis.</p> <p>1 day</p> | <p>Engage: Review key ideas from previous lesson.</p> <p>Explore: Preview photo and diagram on page 53 and identify source of energy, process, and make a prediction about the lesson. Read pp 52-53 to find out how plants capture the energy from the sun.</p> <p>Explain: Define photosynthesis and chlorophyll. Describe the process of photosynthesis.</p> <p>Elaborate: Find out more about photosynthesis. Research different kinds of organisms that utilize photosynthesis.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Explain what happens during the process of photosynthesis. • Identify the substance that allows plants to capture the sun's energy. • Summarize the two materials used in photosynthesis and where they come from. | <p>Interactive Science Notebook Access to internet</p> |
| <p>Lesson 25 (TG pages 54-55)</p> <p>NJSLS PS3.D(5-PS3-1) The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water)</p> <p>NJSLS LS1.C (5-LS-1) Plants acquire their material for growth chiefly from air</p> <p>Objective: Students will be able to explain that plants get the materials they need for growth chiefly from air and water.</p> | <p>Engage: Encourage students to describe large trees and predict where their materials in them came from.</p> <p>Explore: Preview the heading on pp 54, discuss the plants and speculate where they get the materials they need to grow. Read pp. 54-55 to find where plants get what they need to grow.</p> <p>Explain: Explain how plants get carbon dioxide and water; describe the role of mineral nutrients.</p> <p>Elaborate: Learn more about the relationship between plants and the amount of carbon dioxide in the air</p> | <p>Interactive Science Notebook Access to Internet</p> |

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| <p>1 day</p> | <p>and how it affects the total amount of carbon dioxide in the air. Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> Recall where most of the material in a plant comes from Describe from where plants get mineral nutrients Analyze why people call fertilizers plant food. Is this accurate? | |
| <p>Lesson 26 (TG pages 56-59)</p> <p>NJSLS LS1.C (5-LS1-1) Plants acquire their material for growth chiefly from air</p> <p>Objective: Students will be able to identify some of the conditions that make it difficult to grow enough food for all the people on the Earth and describe hydroponics and explain how it can help increase the supply of food for humans</p> <p>2 days</p> | <p>Engage: Review concepts from previous lesson and predict how humans and plants get their energy. Explore: Preview pp 56-57, read the captions, and describe what conditions are observed in the photo. Read to learn how soil conditions can limit the amount of food grown in an area and how hydroponics may provide one solution for this problem. Explain: Identify the problem & solution with regard to crops and hydroponics. Elaborate: Research and speculate how hydroponics can help people in cities and in space. Evaluate: "Wrap it up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> Define hydroponics Compare and contrast the way plants grow in soil and hydroponics. As the world population increases, there may be less land available to grow. How can hydroponics help to solve this problem? | <p>Interactive Science Notebook Access to internet</p> |
| <p>Lesson 27 (TG pages 60-61)</p> <p>NJSLS 5-LS1-1 5 Support an argument that plants get the materials they need for growth chiefly from air and water.</p> <p>Objective Students will be able to conduct an investigation to determine if plants can grow without soil.</p> <p>2 – 4 days</p> | <p>Engage: Remind students that in previous lessons they learned 3 things plants need to grow. Explore: Guide groups through Investigation on pp 60-61. Students will make predictions, observations, record and analyze data. Explain: Share observations and conclusions with class and within groups. Discuss findings. Elaborate: Have teams brainstorm ways to extend the investigation and observe the plants over multiple days. Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> How did the plant change during the period you were watching it? Use evidence from your investigation to support an | <p>For groups:</p> <ul style="list-style-type: none"> 8 oz clear plastic container with a lid that has a hole in the center Young plant Pitcher of water 3 cotton balls 5 drops of liquid houseplant fertilizer <p>Interactive Science Notebook</p> |

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| | <p>argument that plants can grow without soil.</p> <ul style="list-style-type: none"> • What was the source of the materials that the plant used to grow? • What would happen if you put the plant in a dark closet? Why? | |
| <p>Lesson 28 (TG page 62-63 & 62a-63b)</p> <p>NJSLS 5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.</p> <p>Objective: Students will be able to use evidence to support the argument that plants get the materials they need for growth chiefly from air and water</p> <p>2 days</p> | <p>Engage: Set the scene and have students reflect on plant study, photosynthesis and hydroponics. Discuss.</p> <p>Explore: Preview photo on pp 62-63, reflect and read caption. Read together pp 62-63 to find evidence to draw conclusions about materials plants need to survive.</p> <p>Explain: Look for evidence in places other than text (text features: captions, images, charts/ tables, etc.) Mini lesson on quoting text properly.</p> <p>Evaluate & compare evidence among peers. Construct an argument and generalize information like a scientist.</p> <p>Elaborate: In science notebook teams expand activity by exploring the role of chlorophyll in food making process.</p> <p>Evaluate: Teacher and Student rubrics for the following:</p> <ul style="list-style-type: none"> • List materials and evidence • Compare • Construct an argument • Generalize | <p>Interactive Science Notebook Paper</p> |
| <p>Lesson 29 (TG page 64-65)</p> <p>NJSLS LS1.C (5-PS3-1) Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.</p> <p>Objective: Students will be able to explain that food provides animals with the materials they need for growth and body repair and the energy they need for motion and to maintain body warmth</p> <p>1 day</p> | <p>Engage: Recall experiences feeding pets and discuss.</p> <p>Explore: Observe pictures on pp 64-65 and predict lesson; share. Read pp 64-65 to find out why animals need food.</p> <p>Explain: Describe how an elephant gets and uses energy in food; describe how animals use the materials and energy in food; refer to text.</p> <p>Elaborate: Find out more about how animals keep warm. Research Mammals vs birds, pick an animal from a cold climate and research how it keeps its body warm. Explain and share.</p> <p>Evaluate: "Wrap It up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Where do animals get the materials they need to grow larger? • What are some ways that animals use the energy in food? • Warm-blooded animals, such as songbirds, have a high body temperature. Cold- | <p>Interactive Science Notebook Access to internet</p> |

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| | <p>blooded animals, such as frogs, have a body temperature that is close to their environment. Which kind of animal do you think would need to eat more food? Why?</p> | |
| <p>Lesson 30 (TG page 66-67)</p> <p>NJSLS LS1.C (5-PS3-1) Food provided animals with the material they need for body repair and growth and the energy they need to maintain body warmth and for motion.</p> <p>Objective: Student will be able to use a food chain to describe the flow of energy from the sun through the plants and animals in an ecosystem.</p> <p>1 day</p> | <p>Engage: Draw a picture of a necklace or bracelet and direct attention to the links. Discuss the importance of the links.</p> <p>Explore: Preview the lesson; observe diagram on pp 66-67. Ask probing questions and discuss. Read pp 66-67 to find out how energy from the sun is transferred from one organism to another in a food chain.</p> <p>Explain: Describe food chains; identify producers and consumers in a food chain; describe the flow of energy through a desert food chain.</p> <p>Elaborate: Find out more about consumers; choose an animal shown in the food chain and research what it eats and what eats it; create a new food chain and draw it in INTERACTIVE SCIENCE NOTEBOOK.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is a food chain? • How do producers and consumers each obtain the energy they need to live and grow? • Could producers live without consumers? Explain. | <p>Interactive Science Notebook Access to Internet *crayons/colored pencils</p> |
| <p>Lesson 31 (TG page 68-69)</p> <p>NJSLS PS3.D (5-PS3-1) The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter.</p> <p>Objective: Students will be able to use food chains to compare the pathway of energy from the sun through the organisms in two different environments.</p> <p>1-2 days</p> | <p>Engage: Recall what students have learned about food chains from pp 66-67. Explain the food chain and symbols.</p> <p>Explore: What does it mean to compare and contrast? Discuss and create a chart comparing and contrasting various animal.</p> <p>Explain: Compare and contrast food chains by using teams. Read pp 68-69 and observe diagrams; look at titles of two food chains.</p> <p>Elaborate: Use books or internet to research organisms in different food chain and record finding in INTERACTIVE SCIENCE NOTEBOOK to compare and contrast with lesson. Discuss and share.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is the original source of energy for both food chains? • How are the producers and consumers in the pond like | <p>Interactive Science Notebook Access to library materials Access to internet</p> |

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| | those in the rain forest? How are they different? | |
| <p>Lesson 32 (TG page 70-71 & 71a-71b)</p> <p>NJSLS (5-PS3-1) Use models to describe that the energy in animals' food was once energy from the sun.</p> <p>Objective: Students will be able to use a model to describe that energy in animals' food was once energy from the sun</p> <p>2 days</p> | <p>Engage: Recall past learning; ask probing questions.</p> <p>Explore: Preview lesson – use photo on page 70-71 to develop a food chain; ask question: use resources to find information about several food chains and create a model to share with class; read pp 70-71.</p> <p>Explain: Research an environment and use 3 different sources. Record resources in INTERACTIVE SCIENCE NOTEBOOK. Assemble your model; analyze and revise your model; present your model.</p> <p>Elaborate: Partners will work together to compare and contrast their research and models.</p> <p>Evaluate: Answer in INTERACTIVE SCIENCE NOTEBOOK and use rubrics</p> <ul style="list-style-type: none"> • What environment did you select? • What is the producer in your food chain? • What is the first consumer in your food chain? What is the second? • What is the original source of energy for all of the organisms in your food chain? | <p>Print and digital resources for research</p> <p>Access to internet</p> <p>Crayons/ colored pencils</p> |
| <p>Lesson 33 (TG page 72-73)</p> <p>NJSLS LS2.A (5-LS2-1) The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.</p> <p>Objective: Students will be able to describe the flow of energy from the sun through the organisms in a food web.</p> <p>1 day</p> | <p>Engage: Reflect on a picture of a web; describe and point out numerous connections</p> <p>Explore: Observe diagram on pp 72-73 explore the energy in food web. Read pp 72-73 to find how energy from the sun is transferred as organisms eat other organisms in an ecosystem.</p> <p>Explain: Define a food web; identify producers and consumers in a food web; trace the flow of energy in a food web; speculate about changing conditions such as removing a plant or animal</p> <p>Elaborate: Modify a desert food web; Replace with a horned lizard. Research and record finding in INTERACTIVE SCIENCE NOTEBOOK. Learn more about animals in a food web by researching more desert animals to expand the web- what they eat and what eats them. Record in INTERACTIVE SCIENCE NOTEBOOK.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Explain how energy flows through a food web. | <p>Interactive Science Notebook</p> <p>Access to internet</p> |

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| | <ul style="list-style-type: none"> • Contrast how a food web is different from a food chain. • Infer what would happen if disease kills most of the hawks in a part of the desert. How might the loss of the hawks affect the other animals in the area? | |
| <p>Lesson 34 (TG page 74-75)</p> <p>NJSLS LS2-A (5-LS2-1) The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.</p> <p>Objective: Students will be able to describe the role of decomposers in food webs and in cycles of matter</p> <p>1 day</p> | <p>Engage: Share observations of mushrooms growing in the wild and similar questions to probe for background.</p> <p>Explore: Observe photos on pp 74-75; read heading. Speculate what "decomposer" means. Read pp 74-75 to learn about the role of decomposers in food webs and cycles of matter.</p> <p>Explain: Define decomposers, fungi, and bacteria; describe the role of decomposers in cycles of matter. IE: consider recycling.</p> <p>Elaborate: Research different kinds of mushrooms that grow in local ecosystems; research and design compost area.</p> <p>Evaluate: Wrap It Up! INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What are two kinds of decomposers? • Explain how decomposers get energy. • Suppose there were no decomposers in the soil. How might this affect plants growing in the area? | <p>Interactive science notebook Access to internet Reference books, field guides</p> |
| <p>Lesson 35 (TG page 76-77)</p> <p>NJSLS LS2-B (5LS2-1) Matter cycles between the air and the soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases and water from the environment and release waste matter (gas, liquid, or solid) back into the environment.</p> <p>Objective: Students will be able to describe how matter cycles through an ecosystem and among the plants, animals, and microbes that live and die in the environment.</p> <p>1 day</p> | <p>Engage: Define "cycle" in own words; give examples.</p> <p>Explore: Preview photo, diagram, and heading on pp 76-77 for relationships; share. Read pp 76-77 to find out how matter cycles through organisms and the environment.</p> <p>Explain: Describe the cycles of matter; describe the carbon dioxide-oxygen cycle; describe the nitrogen cycle. Explain interactions.</p> <p>Elaborate: Research how humans affect the carbon dioxide-oxygen cycle of matter.</p> <p>Evaluate: "Wrap It Up!"</p> <ul style="list-style-type: none"> • Describe the roll of decomposers in the nitrogen cycle. • Explain why the carbon dioxide-oxygen cycle is important to plants and animals. • The following organisms are part of the nitrogen cycle: microscopic decomposers, | <p>Interactive Science Notebook Access to internet</p> |

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| | <p>plant, rabbit. Draw a diagram with arrows that put the organisms in the correct order. Begin with nitrogen in the soil.</p> | |
| <p>Lesson 36 (TG page 78-79)</p> <p>NJSLS LS2.A (5-LS2-1) The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.</p> <p>Objective: Students will be able to explain that organisms can survive only in environments in which their particular needs are met.</p> <p>1 day</p> | <p>Engage: Ask students to think of what they need to live. What are basic needs. Discuss.</p> <p>Explore: Preview the lesson title and photos on pp. 78-79. Read to learn how the environment determines which organisms can survive in an ecosystem.</p> <p>Explain: Define Ecosystem; Describe how the needs of organisms that live in a tall grass prairie are met; explain that organisms survive only where their needs are met.</p> <p>Elaborate: Compare ecosystems; encourage students to research other major ecosystems and record in INTERACTIVE SCIENCE NOTEBOOK to share.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • Define ecosystem • Infer what some of the nonliving things you can observe in a tall grass prairie are. • Explain how the physical characteristics of an environment help support the organisms that live there. | <p>Interactive Science Notebook Access to Internet</p> |
| <p>Lesson 37 (TG page 80-81)</p> <p>NJSLS LS2.A (5-LS2.1) The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.</p> <p>Objective: Students will be able to describe the levels of organisms that make up an ecosystem.</p> <p>1 day</p> | <p>Engage: Discuss "Community" and what is needed.</p> <p>Explore: Observe the photo on pp 80-81 for patterns. Read to learn how individuals, populations, and communities make up an ecosystem.</p> <p>Explain: Define species and population. Describe communities; describe a healthy ecosystem.</p> <p>Elaborate: Research prairie dog communities; record in INTERACTIVE SCIENCE NOTEBOOK and prepare a classroom model of a grassland food web.</p> <p>Evaluate: "Wrap It Up!"</p> <ul style="list-style-type: none"> • List three levels of organisms that make up a community • Compare how population is different from community. | <p>Interactive Science Notebook Craft materials for "Elaborate" Access to research materials and internet</p> |
| <p>Lesson 38 (TG page 82-83)</p> <p>NJSLS PS3.D (5-PS3-1) The energy released from food was once energy from the sun that was captured by</p> | <p>Engage: Discuss producers, consumers, and decomposers that might exist in a pond and the source of energy.</p> <p>Explore: Guide students through investigation on pp 82-83. Students</p> | <p>For Groups: Clear plastic bottle Sand Small rocks in a plastic cup Hand lens Elodea</p> |

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| <p>plants in the chemical process that forms plant matter.</p> <p>Objective: Students will be able to observe the way organisms live and survive in their ecosystem by interacting with other organisms and non-living elements and describe the flow of energy derived from the sun through an ecosystem.</p> <p>1 day to build-7 days to observe</p> | <p>will construct a table, make claims, gather evidence and draw conclusions.</p> <p>Explain: Students will draw a diagram of a pond ecosystem, label each part, and explain its purpose. Students will discuss energy and parts of a food chain.</p> <p>Elaborate: Continue to observe for additional days and look for changes and record in INTERACTIVE SCIENCE NOTEBOOK.</p> <p>Evaluate: "Wrap it Up!" In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • How did your observations help you classify producers and consumers in your ecosystem? • In what ways is your model like a real pond? In what ways is it different? | <p>Snails Interactive Science Notebook Access to Internet</p> <p>For teacher: Sharp scissors Masking tape</p> |
| <p>Lesson 39 (TG page 84-85 & 84a-85b)</p> <p>NJSLS (5-LS2-1) Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.</p> <p>Objective: Students will be able to develop a model to describe movement of matter among plants, animals, decomposers, and the environment.</p> <p>2 days</p> | <p>Engage: Recall what they learned about cycles of matter and rereading pp 76-77.</p> <p>Explore: Using the words producer, consumer, microbes in the soil, and air, create a diagram of the carbon dioxide cycle including arrows to show the movement of oxygen and carbon dioxide; read introductory text on pp 84 and then the directions on pp 84-85.</p> <p>Explain: Research an ecosystem; draw information from other sources. Analyze and revise your model. Present your model.</p> <p>Elaborate: Research another important cycle and compare.</p> <p>Evaluate: In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What environment did you select? • What is the producer in your food chain? • What is the first consumer in your food chain? The second? • What is the original source of energy for all of the organisms in your food chain? | <p>Access to internet Interactive Science Notebook Access to other reference material</p> |
| <p>Lesson 40 (TG page 86-87)</p> <p>NJSLS LS2-A (5-LS2-1) Newly introduced species can damage the balance of an ecosystem.</p> <p>Objective: Students will be able to describe how newly introduced species can damage the balance of an ecosystem.</p> | <p>Engage: Ask students think of weeds and how they interact with various environments.</p> <p>Explore: Observe the photo on pp 86-87 and make predictions about the lesson. Read pp 86-87 in order to describe how invasive organisms can damage an ecosystem.</p> <p>Explain: Describe invasive species; describe how newly introduced species can damage an ecosystem.</p> | <p>Access to internet Interactive Science Notebook</p> |

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| <p>1 Day</p> | <p>Elaborate: Research an invasive plant that grows in our region and provide background and information. Record in INTERACTIVE SCIENCE NOTEBOOK and communicate with peers.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is an invasive species? • Infer how daily life in the south might be affected by the kudzu bugs learned about in Explain. • Infer what could happen if you planted an invasive plant near your home. | |
| <p>Lesson 41(TG page 88-89)</p> <p>NJSLS LS2.A (5-LS2-1) Newly introduced species can damage the balance of an ecosystem.</p> <p>Objective: Students will be able to describe how a newly introduced species is damaging the balance of an ecosystem and explain how scientists are using another species to control the population of an invasive species.</p> <p>1 day</p> | <p>Engage: Think about an unwanted insect and speculate problems, removal, and what to do if problems can't be solved.</p> <p>Explore: Observe photo and heading on pp 88-89 and predict the meaning of invade. Observe photo and diagram on pp 90-91 and interpret/predict. Read pp. 88-91 in order to learn about some of the problems caused by red imported fire ants and how scientists are using phorid flies to help solve these problems.</p> <p>Explain: Identify and explain the problem and solution regarding the red imported fire ant.</p> <p>Elaborate: Why is it important to international laws regarding bringing plants and animals into other countries? Research, record, and share how scientists control invasive species.</p> <p>Evaluate: "Wrap It Up!" INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is an invasive species? • How to phorid flies affect the behavior of red imported fire ants? How does this affect the population? • Are phorid flies an invasive species? Explain. | <p>Access to internet and research material</p> <p>Interactive science notebook</p> |
| <p>Lesson 42 (TG page 92-93)</p> <p>NJSLS (2-ESS2.1) Scientists study the natural and material world.</p> <p>Objective: Students will be able to describe how a conservationist studies the natural world and works with other people to save natural resources.</p> <p>2 days</p> | <p>Engage: Share experiences working to save the environment. Be specific and explain.</p> <p>Explore: Look at images and headings on pp 92-95; Predict the lesson and what a conservationist does; where might one work? Read pp 92-95 in order to describe the work of a conservationist.</p> <p>Explain: Describe the work of a conservationist. Reread and point out various places for students to reread and ask probing questions to check</p> | <p>Access to internet</p> <p>Access to other print research material</p> <p>Interactive Science Notebook.</p> |

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| | <p>for comprehension. Explain the relationship between water and ecosystems in the delta. Describe the relationship between salt cedar and native plants. Ask students what they think about being a conservationist and what skills are needed. Discuss. Elaborate: Research other careers in conservation. Why do people do it? Research local conservation projects and record finding in INTERACTIVE SCIENCE NOTEBOOK to share. Evaluate: In INTERACTIVE SCIENCE NOTEBOOK</p> <ul style="list-style-type: none"> • What is a conservationist? • What is Dr. Ovel Hinojosa doing to conserve the Colorado River Delta. • How will restoring water to the Colorado river Delta affect the health of the ecosystem in the delta? • Are the wetlands of the Colorado River Delta important to humans? Explain. | |
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Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

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| <p>Standard(s):Energy in Chemical Processes and Everyday Life The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)</p> | |
| <p>4.0</p> | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Research and explain epiphytes and make predictions about how they can grow high off the ground. Share • Understand HOW a variety of organisms carry out photosynthesis and use the products of photosynthesis. • Summarize how trees and other plants affect the level of carbon dioxide in the air • Compare and contrast a marine food chain with a pond food chain • Draw information from multiple sources to various other ecosystems and explain • Observe model for changes over time |
| <p>3.0</p> | <p>Students will be able to:</p> <ul style="list-style-type: none"> • List what plants need and identify source of energy • Explain that the energy is from the sun in the process of photosynthesis • Explain that plants get most of what is needed from air and water • Use food chain to compare the pathway of energy from sun • Use a model to explain the pathway of energy • Observe organisms in an ecosystem and describe the flow of energy |
| <p>2.0</p> | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Define photosynthesis • Define chlorophyll • Define nutrients |
| <p>1.0</p> | <p>With help, partial success at level 2.0 content and level 3.0 content:</p> |
| <p>0.0</p> | <p>Even with help, no success</p> |

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| <p>Standard(s): The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)</p> | |
| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Modify and revise a dessert food chain and how a particular animal may fit in • Find and research various types of fungi like mushrooms and how they interact with their particular ecosystems • Research how human activities can affect cycles of matter • Research other ecosystems and compare and graph findings • Record and share findings on prairie dog community and develop a large classroom model of a grassland ecosystem • Find information about another important cycle, compare to ecosystems, record findings • Speculate and make predictions about another invasive plant. What can be done? • Reflect on international laws and infer why they are important |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Describe the flow of energy from the sun through organisms • Describe the role of decomposers • Describe how matter cycles through organisms in an ecosystem • Explain that organisms can only survive in environments that support needs • Describe the levels of organisms in an ecosystem • Develop a mode to describe movement of matter among plants • Describe how a newly introduced species can influence an ecosystem • Describe how a newly introduced species can damage the balance of an ecosystem |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Define food web • Define composer • Define fungi • Define bacteria • Define ecosystem • Define species • Define population • Define community • Define invasive species |
| 1.0 | <p>With help, partial success at level 2.0 content and level 3.0 content:</p> |
| 0.0 | <p>Even with help, no success</p> |

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| Standard: Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) LS1-C | |
| 4.0 | Students will be able to: <ul style="list-style-type: none"> Summarize how trees and other plants affect the level of carbon dioxide in the air Identify ways hydroponics can be used in cities and possibly in space and explain HOW it would benefit humans Expand an investigation and see how long plant can continue to grow Explore the roll of chlorophyll in food making processes Discuss how keeping a high body temperature helps certain animals stay warm when it is cold Choose a consumer and discover what it eats and may eat it |
| 3.0 | Students will be able to: <ul style="list-style-type: none"> Explain that plants get most of what is needed by air and water Identify difficult conditions for plants to grow and describe/ Explain hydroponics Conduct an investigation to determine if plants can grow without soil Use evidence to support an argument that plants get what they need mostly from air and water, Explain how plants provide what animals need Use the food chain to describe the flow of energy |
| 2.0 | Students will be able to: <ul style="list-style-type: none"> Define nutrients Define hydroponics Define producer Define consumer |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

Unit Modifications for Special Population Students

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| Advanced Learners | <ul style="list-style-type: none"> Allow students to work independently through Investigations, "Think Like a Scientist", and "Think Like an Engineer." Teacher's guide page 63a *Students will support an argument with evidence by listing materials, comparing lists, and cooperatively constructing further argument around a particular material *Put students into teams to expand the activity *Teams will research the role of chlorophyll in the plant's food making process *Record findings in interactive science notebooks and be prepared to creatively present to other teams Teacher's guide page 71a *Students can discuss, plan, and brainstorm for ideas for their own environments *What kind of producers would you select? Why? *What kind of consumers would you select? Why? *Show how the proper balance of producers and consumers are important to ensure survival of all organisms in an environment. *Construct a biodome and observe to see these interactions. Teacher's guide page 85a *Have students use digital and print resources to find information about the Water Cycle *Where is water found? *How does it move from nonliving environment to living organisms, *What role do decomposers have in the water cycle? *Have students record finding in Interactive Science journals to share *Student are to create diagrams with labels to show the pathway of water through an ecosystem. Teacher's Guide page 53 <i>Differentiated Instruction Challenge</i> *Students will draw flow charts to describe the process of photosynthesis. Teacher's guide page 79 <i>Differentiated Instruction Challenge</i> *Partners will draw tall grass prairie to illustrate how the ecosystem provides food and protection against predators for animals such as the horned lark and burrowing owl. *Partners will work together to show how some characteristics of the exosystem that are not visible such as air, also support life |
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| | <p>*Pairs will write simple captions to explain their drawings</p> <p>*Have them research and use the chemical formulas for carbon dioxide, oxygen, water, and sugar.</p> |
| Struggling Learners | <ul style="list-style-type: none"> Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook to use with Investigations, Science in a Snap, Think Like a Scientist, and Think like an Engineer. Teacher's Guide page 53 <i>Differentiated Instruction Extra Support</i> <p>*Provide sentence frames such as "In photosynthesis, plants capture energy in (<u>sunlight</u>) to make food; plants use carbon dioxide and (<u>water</u>) to make sugar.</p> <ul style="list-style-type: none"> Teacher's Guide Page 79 <i>Differentiated Instruction Extra Support</i> <p>*Have students work in pairs and use index cards to identify the living and non living things in a prairie ecosystem.</p> <p>*Have them take turns explaining how it meets the needs of the different plants and animals</p> <ul style="list-style-type: none"> Teacher's Guide page 73 <p>*Guide students to understand relationships between food chain and food web based on text evidence.</p> <p>*Have students locate and read definition of <i>food web</i> on page 72</p> <p>*Elicit responses from them using that definition to explain the relationship and have them restate in their own words the relationships and interactions between each animal in several different food chains on page 72-73.</p> <ul style="list-style-type: none"> Pair with higher ability learners when appropriate Allow for small groups and mini lessons with teacher Vary roles in heterogeneous groups to allow for different learning styles |
| English Language Learners | <p>TG page 73</p> <ul style="list-style-type: none"> Identify vocabulary site words Use sentence frames to use vocabulary words correctly <p>IE: A single pathway of energy is a (<u>food chain</u>); The grasshopper and the mountain lion are in the same (<u>food web</u>.)</p> <ul style="list-style-type: none"> Describe information by using sentence stems Use charts to compare and contrast various aspects of the unit such as producers and consumers |
| Special Needs Learners | <ul style="list-style-type: none"> Refer to IEP's for modifications Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook. Teacher's Guide page 53 <i>Differentiated Instruction Extra Support</i> <p>*Provide sentence frames such as "In photosynthesis, plants capture energy in (<u>sunlight</u>) to make food; plants use carbon dioxide and (<u>water</u>) to make sugar.</p> <ul style="list-style-type: none"> Teacher's Guide Page 79 <i>Differentiated Instruction Extra Support</i> <p>*Have students work in pairs and use index cards to identify the living and non-living things in a prairie ecosystem.</p> <p>*Have them take turns explaining how it meets the needs of the different plants and animals</p> <ul style="list-style-type: none"> Modify Investigations, Science in a Snap, Think Like a Scientist, and Think Like an Engineer by chunking and shortening expected responses and tasks. Provide small group instructions |

Interdisciplinary Connections

Indicators:

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS1-1)

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

Mathematics –

MP.2 MP.4 MP.5 5.NBT.A.1

5.NF.B.7 5.MD.A.1

5.MD.C.3 5.MD.C.4

Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)

Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)

Use appropriate tools strategically. (5-PS1-2),(5-PS1-3)

Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-PS1-1)

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)

Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5-PS1-2)

Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

Integration of 21st Century Skills

Indicators:

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Understand and use technology systems.

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

Select and use applications effectively and productively.

- 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue. 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.

- 8.1.2.C.1 Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
- 8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.

Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

- 8.1.5.E.1 Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions

- 8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

The characteristics and scope of technology.

- 8.2.5.A.1 Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
- 8.2.5.A.2 Investigate and present factors that influence the development and function of a product and a system.

The core concepts of technology.

- 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.

The relationships among technologies and the connections between technology and other fields

- 8.2.5.A.4 Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
- 8.2.5.A.5 Identify how improvement in the understanding of materials science impacts

The cultural, social, economic and political effects of technology.

- 8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

The effects of technology on the environment.

- 8.2.5.B.2 Examine systems used for recycling and recommend simplification of the systems and share with product developers.
- 8.2.5.B.3 Investigate ways that various technologies are being developed and used to reduce improper use of resources.

The role of society in the development and use of technology.

- 8.2.5.B.4 Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.B.5 Explain the purpose of intellectual property law.

The attributes of design.

- 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.3 Research how design modifications have lead to new products.

The application of engineering design.

- 8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.C.5 Explain the functions of a system and subsystems.

The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

- 8.2.5.C.6 Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
- 8.2.5.C.7 Work with peers to redesign an existing product for a different purpose.

Apply the design process.

- 8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Use and maintain technological products and systems.

- 8.2.5.D.3 Follow step by step directions to assemble a product or solve a problem.
- 8.2.5.D.4 Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
- 8.2.5.D.5 Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.

Assess the impact of products and systems.

- 8.2.5.D.6 Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
- 8.2.5.D.7 Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.

Unit Title: UNIT 3: EARTH SCIENCE PART 1: Earth's Systems

Unit Description: Students will study Earth Science by learning how Earth's 4 major systems, the geosphere, the hydrosphere, the atmosphere, and the biosphere interact to affect Earth's surface materials and processes. They will study the distribution of freshwater and saltwater on Earth, including the ocean ecosystem, and learn how the ocean shapes the land and influences climate. Finally, students will understand how human activity impacts land, vegetation, water, air, and space, but that humans are also working to protect these valuable resources

Unit Duration: One Marking Period: MP3 (43 days)

27 lessons (about 33 days) broken into 3 sections by standard (at the end of each section is included a Performance Expectation lesson):

Section 1: ESS2.A: Earth Materials and Systems

Section 2: ESS2.C: The Roles of Water in Earth's Surface Processes

Section 3: ESS3.C: Human Impacts on Earth's Systems

Plus 6 days for review/assessment of Disciplinary Core Ideas:

Quiz 1: Sections 1 and 2

Quiz 2: Section 3

Unit Test: Sections 1-3

Optional: Up to 4 days for Supplemental Reading Lessons in Ladders:

Earth Science: Earth's Crazy Climate

Earth Science: Power Up

****ADVANCE PREPARATION:**

1) Gather small plants, soil, and gravel for Lesson 49: Interactions of Earth's Systems (p. 110), which occurs about 7 days into the unit

2) Plant rye grass seeds towards the beginning of this unit; you will need the rye grass in Lesson 61: Plants and Pollution (p. 134); guide suggest planting seeds at least 2 weeks before the investigation lesson; this lesson occurs about 20 days into the unit; students will continue to monitor rye grass for two weeks

Desired Results

Standard(s): PERFORMANCE EXPECTATIONS

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| 5-ESS2-1. | Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.] |
| 5-ESS2-2. | Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.] |
| 5-ESS3-1. | Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. |

Indicators: DISCIPLINARY CORE IDEAS

ESS2.A: Earth Materials and Systems

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

ESS2.C: The Roles of Water in Earth's Surface Processes

Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

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

DESIRED RESULTS

Understandings:

Students will understand that...

Earth's Materials and Systems

- Earth has 4 major systems: the hydrosphere, geosphere, atmosphere, and biosphere
- Earth's systems interact and affect Earth's materials and processes.
- Interactions of Earth's systems result in weather patterns.
- The ocean supports a variety of ecosystems and organisms.
- The ocean shapes landforms through erosion and deposition.
- The ocean influences climate.
- Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
- Models are helpful to show concepts that may be difficult to observe in real-time.

The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean.
- Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.
- Scientist display data using graphs.

Human Impacts on Earth's Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- Individuals and communities are doing things to help protect Earth's resources and environments.

Obtaining, evaluating, and communicating information is part of evaluating the quality and accuracy of ideas and methods in science.

Essential Questions:

- What are earth's major systems and how do they interact?
- How do Earth's systems affect weather patterns?
- How does the ocean support life?
- How does the ocean affect landforms and climate?
- How does the atmosphere affect landforms?

- Where on Earth are freshwater and saltwater found?

- What is the difference between renewable and nonrenewable resources?
- How do people affect the land, vegetation, water, air, and space?

How are people working together to clean up and protect land, air, and water?

Performance Tasks:

Investigate Lessons: Students will practice performance tasks in cooperative groups engaging in scientific inquiry.

- Lesson 49 (page 110) Investigate Interactions of Earth's Systems
Model Interactions of Earth's Major Systems
Describe how the geosphere, atmosphere, hydrosphere, and biosphere interact.
- Lesson 57 (page 126) Investigate Graphing Water Data
Graph the amounts and percentages of salt water and fresh water on Earth
- Lesson 61 (page 134) Investigate Plants and Pollution
Model the impact of human activity on various ecosystems
Describe how acidic chemicals affect the growth of plants
- Lesson 68 (page 150) Investigate Using Solar Energy
Investigate how solar energy can be used to make water cleaner.

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook
- Science in a Snap (Lesson 65)
- Think Like an Engineer Case Study (Lesson 66)
Tower of Trees
Identify the benefits of trees in an urban environment;
Describe methods that engineers have developed for growing trees in crowded cities
- Quizzes
- Unit Tests

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| <p>Think like a Scientist: Students will develop a model, provide evidence, & identify materials cooperatively using science inquiry, providing evidence, analyzing data and drawing conclusions. All information will be recorded in Interactive Science Notebook and evaluated based on Teacher and Student Rubrics.</p> <ul style="list-style-type: none"> Lesson 55 (page 112) Develop a Model- Describe an interaction between two of Earth's systems, or spheres Explain interactions demonstrated in model Lesson 69 (page 152) Obtain and Combine Information – Work with a group to obtain information about ways individual communities use science ideas to protect Earth's resources and environment <p>Combine information from investigation to communicate their results to others</p> | |
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Benchmarks: Benchmarks will be administered twice during the school year (at the end of Marking Period 2 and 4). The benchmark at the end of Marking Period 2 will include concepts from Physical and Life Science. The benchmark at the end of Marking Period 4 will include concepts from Earth Science.

| LEARNING PLAN | | |
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| SECTION 1: Earth Materials and Systems NJSL ESS2.1 | | |
| <p>Lesson 43 (p. 98) Earth's Major Systems</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.</i></p> <p>Objective: Students will be able to identify Earth's major systems; they will recognize that these systems interact and affect Earth's materials and processes.</p> <p>1 day</p> | <p>Engage: SW describe any personal experiences they have had with outdoor activities that involve nature.</p> <p>Explore: Preview pp. 98-99 to explain how photos show how different parts of Earth are related; set reading purpose to identify Earth's major systems and how they interact; read 98-99</p> <p>Explain: Explain meaning of prefixes geo-, hydro-, atmo-, and bio-; identify solid and liquid features found in geosphere and hydrosphere; explain how biosphere differs from other 3; identify how biosphere and hydrosphere interact; identify how biosphere interacts with atmosphere</p> <p>Elaborate: In groups of 4, students create a poster to represent the 4 systems using features from our state and explain in captions how they interact; students can provide other real-world examples of how systems interact and change the earth</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> Identify Earth's 4 major systems Classify given items into each | <p>Science Notebook Poster Board Access to the internet</p> |

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| <p>Lesson 44 (p. 100) The Geosphere</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.</i></p> <p>Objective: Students will be able to describe the geosphere and explain how it interacts with other systems to affect Earth's surface materials and processes.</p> <p>1 day</p> | <p>Explain which systems interact when beaver builds a dam</p> <p>Engage: Tap prior knowledge of recent earthquakes pf volcanic eruptions and ask which parts of geosphere they think were involved.</p> <p>Explore: Observe volcanic eruption photo p. 100; ask what is happening and how it will affect geosphere; set reading purpose: describe geosphere and how it interacts with other systems to affect Earth's surface; read p. 100-101.</p> <p>Explain: SW use text to describe geosphere, including what it is made of, its features, and how it volcanic eruptions change the land's shape. Revisit to explain how geosphere interacts with biosphere, atmosphere, and hydrosphere.</p> <p>Elaborate: 1) How might water erosion change the shape of Earth's geosphere? 2) Research and illustrate layers of Earth's interior.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> Identify two processes that take place in the geosphere. Explain how water in hydrosphere can change geosphere. Explain how volcanic ash in the it might affect plants and animals in biosphere | <p>Interactive Science Notebook Access to internet</p> |
| <p>Lesson 45 (page 102) The Hydrosphere</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</i></p> <p>Objective: SWBAT describe the hydrosphere and explain how it interacts with other systems to</p> | <p>Engage: Tap prior knowledge by having students describe what happens to puddles, snow, ice they observed in environment.</p> <p>Explore: SW Preview p. 102 and tell how thy think clouds, salt water, and icebergs are related; SW set a reading purpose: describe hydrosphere and how it interacts with other systems to affect Earth's surface and processes; read pp. 102-103.</p> <p>Explain: Using the text, describe the hydrosphere, how the water of the hydrosphere moves, and name at least two ways the hydrosphere interacts with biosphere.</p> <p>Elaborate: 1) Use vocab from text to diagram the water cycle 2) Research percentages of salt, fresh, and frozen water on earth and present using graphic organizer.</p> | <p>Interactive Science Notebook Access to Internet</p> |

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| <p>affect Earth's surface materials and processes.</p> <p>1 day</p> | <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Define groundwater • Identify what process moves water from Earth's surface to the atmosphere • Explain how water in the atmosphere returns to Earth's surface. | |
| <p>Lesson 46 (p. 104) The Atmosphere</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</i></p> <p>Objective: SWBAT describe the atmosphere and explain how it interacts with other systems to affect Earth's surface materials and processes.</p> <p>1 day</p> | <p>Engage: Tap prior knowledge by asking students to describe today's weather.</p> <p>Explore: SW Preview p. 104 and tell what they think they will learn about the atmosphere; SW set a reading purpose: describe atmosphere and how it interacts with other systems to affect Earth's surface and processes; read pp. 104-105.</p> <p>Explain: Using the text, describe the atmosphere, including the most common gases and processes that occur there; describe ways the atmosphere interacts with the hydrosphere and geosphere.</p> <p>Elaborate: 1) Research layers of atmosphere and diagram 2) SW find out more about ozone layer and why today holes exist.</p> <p>Evaluate: "Wrap it up!" ISN</p> <ul style="list-style-type: none"> • Identify which gas makes up the largest part of the atmosphere. • Explain how wind affects landforms. <p>Infer: Would you usually expect to find more water in the atmosphere over the land or the ocean? Explain.</p> | <p>Interactive Science Notebook</p> <p>Access to internet</p> |
| <p>Lesson 47 (p. 106) The Biosphere</p> <p>NJSLS ESS2.A Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</i></p> | <p>Engage: Tap prior knowledge by asking students to recall meaning of bio- and cite examples of life.</p> <p>Explore: SW Preview p. 106-107 and tell what they think all the living things have in common; SW recall needs of living things; SW set a reading purpose: describe how living things interact and how biosphere interacts with other systems; read pp. 106-107.</p> <p>Explain: Using the text, describe the biosphere, including organism types and how plants and animals depend on each other; describe ways the organisms of the biosphere obtain water from and interact with the atmosphere.</p> | <p>Interactive Science Notebook</p> |

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| <p>Objective: SWBAT describe the biosphere and explain how it interacts with other systems to affect Earth's surface materials and processes.</p> <p>1 day</p> | <p>Elaborate: Research one of Earth's biomes.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Describe what makes up the biosphere. • Explain how animals interact with the atmosphere. • Explain how the elements of the biosphere and hydrosphere interact. | |
| <p>Lesson 48 (page 108) Earth's Systems Interact</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</i></p> <p>Objective: Students will be able to describe how the interactions of the Earth's systems result in weather patterns known as monsoons.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling how a recent heavy rainfall may have affected the land and bodies of water in the area.</p> <p>Explore: SW recall 4 systems; SW use photo to tell what a monsoon is; SW set a reading purpose: describe how the interactions of Earth's systems can result in an event called a monsoon; read pp. 108-109.</p> <p>Explain: Using the text, SW define monsoon, identify system interactions that cause monsoons, and describe effects.</p> <p>Elaborate: 1) SW research where in US monsoons occur 2) SW use text to diagram summer and winter monsoons.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Define monsoon. • Describe how winter and summer monsoons are alike/different and what causes them. • Describe how summer monsoons in India affect the hydrosphere, geosphere, and biosphere. | <p>Interactive Science Notebook</p> |
| <p>Lesson 49 (p. 110) *INVESTIGATE: Interactions of Earth's Systems</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.</i></p> <p>Objective: SWBAT model the interactions of Earth's major systems and describe how the geosphere, atmosphere,</p> | <p>Engage: Tap prior knowledge by asking students to recall earth's systems and describe examples of how they interact with each other</p> <p>Explore: Guide students through the investigation on pp. 110-111.</p> <p>Explain: SW share observations and conclusions, explain how observations supported predictions, explain how the way water moves through terrarium is similar to the way water interacts with atmosphere, and describe how model is similar to how 4 systems interact.</p> <p>Elaborate: SW compare terrarium to local ecosystem.</p> | <p>Interactive Science Notebook</p> <p>Materials for groups of 4: Safety goggles Clear 2-L bottle w/ top cut off Gravel Potting soil Plastic spoon Small plants Masking tape</p> |

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| <p>hydrosphere, and biosphere interact.</p> <p>1 day for set-up; 5-10 minutes each week for 2 weeks or more for observation</p> | <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Which materials in your terrarium represent each of Earth's four major systems? • How did the plants in your terrarium interact with the hydrosphere? • After a time, drops began to collect on the plastic bottle. What two processes in the atmosphere allowed water to collect there? | |
| <p>Lesson 50 (p. 112): Ocean Ecosystems</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.</i></p> <p>Objective: SWBAT describe a variety of ecosystems and organisms in the ocean.</p> <p>1 day</p> | <p>Engage: Tap prior knowledge by having students recall what kind of ocean life they have seen at the beach. Review hydrosphere and biosphere.</p> <p>Explore: Preview lesson. Ask: What is an ecosystem and what kind of ecosystems exist in oceans? ; Set reading purpose: identify the variety of ecosystems and organisms in the ocean; read pp. 112-113.</p> <p>Explain: Using the text, SW explain: Why are there so many ecosystems in the ocean? Which ecosystem do you think whales live in? Identify several organisms that live in coral reefs. Describe deep ocean ecosystems; How do ocean ecosystems change with depths?</p> <p>Elaborate: 1) SW research coral reefs, display findings, and share 2) What might happen if population of Antarctic krill were to disappear?</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What are the 3 ocean ecosystems? • Which ecosystem supports a greater variety of living organisms, the deep ocean or coral reef? • Why is the ocean able to support many different kinds of ecosystems? | <p>Interactive Science Notebook</p> <p>Access to internet</p> |
| <p>Lesson 51 (p. 114): The Ocean Shapes the Land</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.</i></p> <p>Objective: SWBAT describe how the ocean shapes the land and explain the processes of erosion and deposition.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by sharing how waves move and how they affect sand on the beach.</p> <p>Explore: SW preview lesson to predict that they will learn how ocean shapes the land; SW set reading purpose: identify the 3 ways that the ocean shapes the land; read pp. 114-115.</p> <p>Explain: SW use the text to review earth's systems and interactions, describe ocean currents and waves, and define erosion and deposition.</p> | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |

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| | <p>Elaborate: 1) Research how barrier islands are formed and what happens after a barrier island rises above sea level 2) Find out more about erosion along the shoreline and create a poster to share.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What are two forms of ocean movement that can change the shape of the land? • What is the difference between erosion and deposition? • The strong winds of larger storms increase the size of ocean waves. How might these larger waves affect the amount of erosion on a sandy beach? | |
| <p>Lesson 52 (p. 116): The Ocean Influences Climate</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.</i></p> <p>Objective: Students will be able to describe how the ocean influences climate and explain the difference between weather and climate.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by describing today's weather and the climate of the state.</p> <p>Explore: SW preview lesson to observe image and predict how image relates to how the ocean influences climate; SW set reading purpose: identify the ways that the ocean influences climate; read pp. 116-117.</p> <p>Explain: SW define and differentiate climate and weather and connect the influence of ocean currents to weather and climate.</p> <p>Elaborate: SW research to find out more about Gulf Stream temperatures.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is climate? • Explain how the Gulf Stream affects the climate of the East Coast of North America. • In general, how does the ocean affect the temperature of coastal regions? Explain why. | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>Lesson 53 (p. 118): Landforms and Weather Patterns</p> <p>NJSLS ESS2.A Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</i></p> <p>Objective: Students will be able to describe how winds and clouds in the atmosphere interact with landforms to determine patterns of weather.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling the effect of the ocean on climate.</p> <p>Explore: SW preview lesson to observe mountain diagram and predict how it can affect weather and climate; SW set reading purpose: describe how winds and clouds in atmosphere interact with landforms to determine patterns of weather; read pp. 118-119.</p> <p>Explain: SW use the text to analyze how mountains affect weather patterns and demonstrate understanding of rain shadows.</p> <p>Elaborate: SW research annual rainfall in several cities on either side of Sierra Nevada and describe trends.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Why do clouds form near the top of a mountain range? | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |

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| | <ul style="list-style-type: none"> • Describe the difference between the amount of rain that falls on the ocean side of a mountain range and the amount of rain that falls in a mountain range's rain shadow. • Death Valley in California and Nevada is one of the driest places in North America. Death Valley is located east of the Sierra Nevada. Why is Death Valley so dry? | |
| <p>Lesson 54 (p. 120): The Atmosphere and Landforms</p> <p>NJSLS ESS2.A: Earth Materials and Systems: <i>Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.</i></p> <p>Objective: Students will be able to explain how processes in Earth's atmosphere interact with and change the shape of landforms.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling definition of Earth's atmosphere and what they have learned about how it interacts with earth's other major systems.</p> <p>Explore: SW preview lesson to observe tufa towers and predict how they think the atmosphere might affect the shapes of the landforms; SW set reading purpose: describe how processes in Earth's atmosphere interact with and change the shape of landforms; read pp. 120-121.</p> <p>Explain: Use the text to describe interaction of atmosphere with landforms.</p> <p>Elaborate: 1) SW research, illustrate, and present how tufa towers of Mono Lake are formed 2) SW research, illustrate, and present other famous limestone formations.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What are two factors in the atmosphere that can change the shape of landforms? • How do the acids in rain affect tufa towers? • If the amount of acid in rain increases, how might the organisms living in the lake be affected? | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>The following lesson will demonstrate level of mastery for Goal 1: Use Nat Geo rubric and goal and scale to monitor and assess</p> | | |
| <p>*Lesson 55 (p. 122): THINK LIKE A SCIENTIST: DEVELOP A MODEL</p> <p>NJSLS ESS2.1: <i>Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.]</i></p> <p>Objective: Students will be able to</p> | <p>Engage: SW set the scene by reviewing definitions and describing processes of 4 major spheres and discuss how they interact in coral reef photo on p. 123; SW construct an explanatory model as they plan ideas.</p> <p>Explore: SW design, record plans, gather materials for, and construct their models.</p> <p>Explain: SW analyze, revise, and present models.</p> <p>Elaborate: SW compare and contrast models with other groups.</p> <p>Evaluate: Teachers will use a rubric to assess student models. Students will also respond to the following:</p> <ul style="list-style-type: none"> • What is a model? • What type of model did you use to describe system interactions? Explain. | <p>Interactive Science Notebook</p> <p>For groups of 4: Assemble and set up areas of art materials that students choose for their models, including conceptual (posters, etc.) or physical (terrariums, etc.).</p> |

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| <ul style="list-style-type: none"> • Work with a group to develop a model that describes and interaction between two of earth's systems, or spheres • Explain the interactions demonstrated in their model <p>3 days</p> | <ul style="list-style-type: none"> • Which spheres did you show interacting in your model? How did the spheres interact? What was the result of this interaction? | |
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SECTION 2:
The Roles of Water in Earth's Surface Processes:
NJSLS ESS2.2

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| <p>Lesson 56 (p. 124): Water on Earth</p> <p>NJSLS ESS2.C: <i>The Roles of Water in Earth's Surface Processes</i> <i>Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.</i></p> <p>Objective: Students will be able to recognize that nearly all of earth's available water is in in the ocean and identify sources of fresh water on Earth: glaciers, underground, streams, lakes, wetlands, and the atmosphere.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling definition of Earth's hydrosphere and what they have learned about how it interacts with earth's other major systems.</p> <p>Explore: SW estimate how much of earth's surface is covered by water and compare with globe; SW set reading purpose: identify water sources on Earth; read pp. 124-125.</p> <p>Explain: SW use the text to compare amounts of fresh and salt water on earth and define and describe glaciers.</p> <p>Elaborate: 1) SW research different kinds of glaciers on earth 2) SW describe how glaciers might shape the land they move over</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is groundwater? • The places on Earth that store water are called reservoirs. List the following in order from the reservoir with the greatest amount of water to the reservoir with the least amount of water: groundwater, ocean, lakes, glaciers | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
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The following lesson will demonstrate level of mastery for Goal 2:
 Use goal and scale to monitor and assess.

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| <p>*Lesson 57 (p. 126): <u>INVESTIGATE</u>: Graphing Water Data</p> <p>NJSLS 5-ESS2-2. <i>The Roles of Water in Earth's Surface Processes</i>: <i>Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]</i></p> <p>Objective: Students will be able to graph the amounts and percentages of salt water and fresh water on Earth.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling that all of Earth's water is found in the hydrosphere and describe where they might find salt and fresh water</p> <p>Explore: Read pp. 126-127 together and guide students through investigation.</p> <p>Explain: SW share final graphs and answer questions.</p> <p>Elaborate: 1) SW explain in what other ways they might display the data 2) SW create a circle graph for Earth's freshwater.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • Use evidence from your graph to describe the distribution of salt water and freshwater on Earth. • Use your graph to contrast the amount of groundwater and the amount of water | <p>Interactive Science Notebook</p> <p>For groups of 4: Graph paper, optional: poster paper, construction paper, markers, rulers, protractors</p> |
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| | <p>that is frozen in glaciers. Which reservoir contains more water? Use evidence from your graph to support your answer.</p> <ul style="list-style-type: none"> In many parts of the world there is not enough water in rivers and lakes to supply people's need for fresh water. What are some other sources of fresh water that people could use? | |
| <p>QUIZ #1: This is a good place to quiz the following Disciplinary Core Ideas: Section 1: ESS2.A: Earth's Materials and Systems Section 2: ESS2.C: The Roles of Water in Earth's Surface Processes</p> <p>2 days for review and quiz</p> | | |
| <p>SECTION 3: Human Impacts on Earth's Systems: NJSL ESS3.1</p> | | |
| <p>Lesson 58 (p. 128): Earth's Resources</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> identify air, plants, water, animals, coal, oil, and natural gas as natural resources Classify air, plants, water, and animals as renewable resources, and coal, oil, and natural gas as nonrenewable resources. <p>1 day</p> | <p>Engage: SW tap prior knowledge by describing things that people need in everyday life and what they have in common.</p> <p>Explore: SW preview lesson and describe what photos have in common; SW set reading purpose: identify natural resources and classify them as renewable or nonrenewable; read pp. 128-129.</p> <p>Explain: SW use the text to identify and classify natural resources.</p> <p>Elaborate: 1) SW research local natural resources 2) SW research nonrenewable resources.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> What is the difference between renewable and nonrenewable resources? Are trees a renewable or nonrenewable resource? Explain your answer. List three ways you use renewable resources and three ways you use nonrenewable resources. <p>*An additional interactive assessment activity can be found in the digital book.</p> | <p>Interactive Science Notebook</p> <p>Internet Access</p> |
| <p>Lesson 59 (p. 130): Humans Impact the Land</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</p> <p>Objective: Students will be able to identify ways in which human activities affect the land.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling some ways humans use the land.</p> <p>Explore: SW preview lesson and describe what impact farming and building has on the land; SW set reading purpose: identify ways that human activities impact the land; read pp.130-131.</p> <p>Explain: Use the text to discuss impact of agriculture, building, and industry.</p> <p>Elaborate: 1) SW research, illustrate, and present impact of mining 2) SW describe what impact fertilizers and pesticides might have on the land.</p> <p>Evaluate: "Wrap It Up!" ISN</p> | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |

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| | <ul style="list-style-type: none"> • How can mining minerals to use in industry affect the land? • How might farming cause erosion? • Identify three features near your home that are examples of people changing the land. | |
| <p>Lesson 60 (p. 132): Humans Impact Vegetation</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</p> <p>Objective: Students will be able to identify ways in which human activities affect vegetation.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling what plant products they use every day and how.</p> <p>Explore: SW preview lesson and describe what is happening in the photo and how it may be harmful to the environment; SW set reading purpose: identify how humans impact vegetation; read pp. 132-133.</p> <p>Explain: SW use the text to identify meaning of vegetation and how humans impact it.</p> <p>Elaborate: 1) SW explain how they think deforestation affects the atmosphere 2) SW research consequences of deforestation in rainforests.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is deforestation? • How does agriculture affect the vegetation of grasslands? • Some people live in suburbs where houses have large yards and gardens. Other people live in tall buildings and cities. Which kind of home do you think has a greater impact on the land? | <p>Interactive Science Notebook</p> <p>Internet Access</p> |
| <p>*Lesson 61 (p. 134): INVESTIGATE: Plants and Pollution</p> <p>**ADVANCED PREP: Plant rye grass seed 2 weeks prior to this lesson!</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.</p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Model the impact of human activity on various ecosystems • Describe how acidic chemicals affect the growth of plants. <p>1 day for setup; 5 minutes each day for 2 weeks for observation</p> | <p>Engage: SW tap prior knowledge by recalling what grass needs to survive and what could harm its growth or survival.</p> <p>Explore: Read pp. 134-135 together and guide students through investigation.</p> <p>Explain: SW share observations and conclusions of simulation and explain impact on our own environment</p> <p>Elaborate: 1) SW hypothesize what other types of pollution caused by humans might affect growth of plants 2) SW research strengths and weaknesses of this simulation</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • How is the growth of rye grass in the cups alike and different? How does vinegar affect the rye grass? Use data from your observations in your answer. • How could you plan an investigation to see how salt affects the growth of rye grass? • What else would you like to find out about how pollution in water affects | <p>Interactive Science Notebook</p> <p>For groups of 4: 2 9oz. plastic cups, tape, 75 mL water, 25 mL vinegar, graduated cylinder, *2 containers rye grass (plant seeds 2 weeks prior), hand lens, ruler, spoon, safety goggles for all</p> |

| | the growth of plants? How could you find out? | |
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| <p>Lesson 62 (p. 136): Humans Impact Water</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.</i></p> <p>Objective: Students will be able to identify ways that human activities impact water sources on Earth.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling fresh water sources on Earth and how humans use fresh water.</p> <p>Explore: SW preview lesson and describe what is happening in the photo and how it may be harmful to the environment; SW set reading purpose: identify how humans impact vegetation; read pp. 136-137.</p> <p>Explain: SW use the text to describe human activities connected with water and identify their impacts on fresh water and the ocean.</p> <p>Elaborate: 1) SW research methods of irrigation used by ancient Egyptians and farmers today 2) SW track the amount of water they use each day for a week and explain why they should conserve.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is runoff? • What are two ways that agriculture can affect Earth's freshwater supply? • List three ways that you and your family use water every day. How could you reduce pollution in your everyday water use? | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>Lesson 63 (p. 138): Humans Impact Air</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Identify ways that human activities impact air in Earth's atmosphere • Describe ways that people are working together to clean up the air. <p>1 day</p> | <p>Engage: SW recall from previous lesson the kinds of pollutants that find their way to water and identify which of Earth's other systems pollutants could affect.</p> <p>Explore: SW preview lesson and describe what is happening in the photo and how they think pollutants get into the air; SW set reading purpose: identify how humans impact the air and describe ways that humans are helping to clean it; read pp. 138-139.</p> <p>Explain: SW use the text to identify sources of air pollution, explain smog, and describe how humans can clean up the air.</p> <p>Elaborate: 1) SW research and present the air quality index for their state or county 2) SW generate other ideas for ways people can clean up the air.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What are three ways that burning fuels affects the quality of the air? • What are some ways that people are working together to reduce air pollution? • Instead of riding in a car, you decide to ride your bicycle to school. How could this decision affect air quality? Explain. | <p>Interactive Science Notebook</p> <p>Internet access</p> |
| <p>Lesson 64 (p. 140): Humans Impact Space</p> | <p>Engage: SW tap prior knowledge by sharing where space begins and how humans have explored it.</p> | <p>Interactive Science Notebook</p> |

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| <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to identify ways in which human activities impact space.</p> <p>1 day</p> | <p>Explore: SW preview lesson and describe what is happening in the photos; SW set reading purpose: identify ways that human activities impact space; read pp. 140-141.</p> <p>Explain: Use the text to describe space junk and explain the danger it causes.</p> <p>Elaborate: 1) SW create a graphic of Earth and space junk 2) research how NASA monitors and studies space junk.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is space junk? Give some examples. • Why might space junk be dangerous? | |
| <p>Lesson 65 (p. 142): Protecting Land, Air, and Water</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to explain the importance of conserving Earth's resources and how recycling can help conserve resources.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by describing their experience with curbside or community recycling.</p> <p>Explore: SW preview lesson and infer how photos relate to careful use of resources; SW set reading purpose: Explain importance of conserving Earth's resources and describe ways to conserve them; read pp. 142-143.</p> <p>Explain: SW use text to discuss why conservation is important and ways humans can do so.</p> <p>Elaborate: SW research plastics and use as starting point for SCIENCE IN A SNAP activity on p. 143.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is recycling? • Give three examples of things you can do to conserve natural resources. • Trees are a renewable resource. Why is it important to conserve forests? Explain your answer. | <p>Interactive Science Notebook</p> <p>For SCIENCE IN A SNAP activity:</p> <p>Groups of 4 need a variety of plastic containers with numbered recycling codes.</p> |
| <p>*Lesson 66 (p. 144): THINK LIKE AN ENGINEER: CASE STUDY: Tower of Trees</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Identify the benefits of trees in an urban environment • Describe methods that engineers have developed for growing trees in crowded cities. <p>2 days</p> | <p>Engage: SW tap prior knowledge by recalling the definition of deforestation, why humans do it, and where few trees might be found.</p> <p>Explore: SW preview lesson to describe details in photo; explain that this case study will focus upon how engineers are trying to solve problem of growing trees in cities where there is little space; SW set reading purpose: Identify problems they face as they try to incorporate trees; read pp. 144-147.</p> <p>Explain: SW use the text to identify the problem and solution in case study and identify engineering practices used.</p> <p>Elaborate: 1) SW work in small groups to brainstorm, draw, and share their own design solution 2) SW examine New York's Central Park.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What is a vertical forest? • How could a vertical forest improve air quality? | <p>Interactive Science Notebook</p> |

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| | <ul style="list-style-type: none"> • Do you think vertical forest towers are a good solution for your community? Explain why or why not. | |
| <p>Lesson 67 (p. 148): Renewable Energy Resources</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Describe the difference between nonrenewable and renewable energy resources. • Explain why it is important for humans to conserve energy resources. • Describe alternative energy resources, such as solar, wind, and hydroelectric energy. <p>1 day</p> | <p>Engage: SW tap prior knowledge by describing energy resources they use every day.</p> <p>Explore: SW preview lesson to describe how solar, wind, and hydroelectric energy are used to generate energy for the things they use every day; SW set reading purpose: Identify nonrenewable and renewable energy resources; read pp. 148-149.</p> <p>Explain: SW use the text to describe the difference between renewable and nonrenewable resources.</p> <p>Elaborate: SW find out more about how solar cells or dams are used to generate electricity.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What are three renewable sources of energy? • How does a hydroelectric power plant produce electricity? • How does the use of renewable energy help protect all of Earth's resources? | <p>Interactive Science Notebook</p> |
| <p>*Lesson 68 (p. 150): <u>INVESTIGATE</u>: Using Solar Energy</p> <p>NJSLS ESS3.C: Human Impacts on Earth Systems: <i>Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.</i></p> <p>Objective: Students will be able to investigate how solar energy can be used to make water cleaner.</p> <p>1 day for set up; 15 minutes two days later</p> | <p>Engage: SW tap prior knowledge by recalling how sunlight affects water and what happens to water vapor in the atmosphere.</p> <p>Explore: Read pp. 150-151 together and guide students through the investigation.</p> <p>Explain: SW discuss that this is a simulation of using solar energy to distill water; they will explain what each part represented, compare results to predictions, and explain why the water is clean.</p> <p>Elaborate: 1) SW discuss how they can apply learning to people's need for water 2) SW test whether same process can remove other water impurities.</p> <p>Evaluate: "Wrap It Up!" ISN</p> <ul style="list-style-type: none"> • What processes caused the water to move from the container into the cup? • Describe the water in the cup and the water in the container. • What can you conclude about how solar energy can be used to make water cleaner? | <p>Interactive Science Notebook</p> <p>For groups of 4: plastic container, small ball of clay, 9 oz. plastic cup, measuring cup, water, sandy soil, spoon, plastic wrap, rubber band, rock, safety goggles for all</p> |
| <p>QUIZ #2: This is a good place to quiz the following Disciplinary Core Ideas: Section 3: ESS3.C: Human Impacts on Earth's Systems</p> <p>2 days for review and quiz</p> | | |
| <p>The following lesson will demonstrate level of mastery for Goal 3: Use Nat Geo rubric and goal and scale to monitor and assess.</p> | | |

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| <p>*Lesson 69 (p. 152): THINK LIKE A SCIENTIST: OBTAIN and COMBINE INFORMATION:</p> <p>NJSLS 5-ESS3-1.: <i>Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Work with a group to obtain information about ways individual communities use science ideas to protect Earth's resources and environment • Combine information from their investigation to communicate their results to others <p>3 days</p> | <p>Engage: 1) SW set the scene by giving some examples of ways that people impact Earth's systems 2) SW make a plan for their research by answering questions with their group 3) SW record group's plan in their ISN.</p> <p>Explore: SW gather, analyze, and organize research.</p> <p>Explain: SW prepare a summary of their findings and present to the class.</p> <p>Elaborate: Invite a community member who is active in conservation and protection of natural resources to speak to the class.</p> <p>Evaluate: Teachers will use a rubric to assess student models. Students will also respond to the following:</p> <ul style="list-style-type: none"> • What resources did you find most useful in providing information about how people in our community are protecting resources? • What science ideas are people in our community using as they try to protect these resources? • Which presentation did you find most effective, and why? | <p>Interactive Science Notebook</p> <p>Students will work in groups of 3-4 with specific roles.</p> <p>Have on hand a list of local groups that work to protect and conserve resources such as energy, water, or wildlife.</p> |
| <p>UNIT 3 TEST</p> <p>Disciplinary Core Ideas for Earth's Systems Sections 1-3</p> <p>2 days for review and test Nat Geo Test Questions #1-38</p> | | |

Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

UNIT 3: EARTH SCIENCE GOAL 1

(Resource: Think Like a Scientist p. 122)

Standard: 5-ESS2-1. Earth Materials and Systems

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

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| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Analyze how adding a third or fourth sphere to the model would affect the interaction with the other two. Analyze and revise the model to make it more explicitly show an interaction between systems and explain how the revision improves the model. Compare and contrast the model with another's. Provide constructive feedback. |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Develop a model that describes an interaction between two of Earth's systems. Explain the interaction demonstrated in the model. Design a model, gather the materials, and carry out the steps. |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Define <i>model</i>. Describe how one of Earth's systems interacts with another. Recognize that Earth's major systems interact. Identify Earth's 4 major systems and describe each: <i>geosphere, biosphere, hydrosphere, atmosphere</i> |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content |
| 0.0 | Even with help, no success |

UNIT 3: EARTH SCIENCE GOAL 2

(Resource: Investigate p. 126)

Standard: 5-ESS2-2. The Roles of Water in Earth's Surface Processes

Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]

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| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Generate other ways to display the data in an original graph of choice, such as a 3-dimensional format, and create it. Compare and evaluate the effectiveness of the two graphs in demonstrating Earth's water distribution. Utilize the information in the graph to generate possible solutions for the shortage of fresh water in certain parts of the world. |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Use evidence from the graph to describe the distribution of water on Earth. Graph the amounts and percentages of salt water and fresh water on Earth using a data chart. |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Interpret a data chart. Read and create a circle graph and bar graph. Describe the following types of reservoirs: oceans, ice caps, glaciers, groundwater, surface water. Identify which sources are saltwater and which are freshwater. |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

UNIT 3: EARTH SCIENCE GOAL 3 (Resource: p. 152 Think Like a Scientist: Obtain and Combine Information)

Standard: 5-ESS3-1. Human Impacts on Earth's Systems

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

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| 4.0 | Students will be able to: <ul style="list-style-type: none">Analyze and evaluate other groups' research and presentations to provide feedback about which information was most effective in communicating ways people protect Earth and offer suggestions.Generate a list of interview questions that you could ask a community member who is active in protecting Earth's resources. Interview this person and summarize findings. |
| 3.0 | Students will be able to: <ul style="list-style-type: none">Combine information from the investigation to analyze data, draw a conclusion, and communicate results to others.Obtain information (plan and research) about ways individual communities use science ideas to protect Earth's resources and environment. |
| 2.0 | Students will be able to: <ul style="list-style-type: none">Identify examples of ways that people impact earth's systems.Work with a group to plan a project, access sources of information, and gather data. |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

Unit Modifications for Special Population Students

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| Advanced Learners | <ul style="list-style-type: none"> • Allow students to work independently through Investigations, "Think Like a Scientist", and "Think Like an Engineer" activities. • Use the "Elaborate" sections of the lesson to extend student thinking. Some "Elaborate" activities can be extended over several days or used as long-term independent or small group projects, to demonstrate higher-level understanding of each of the following performance expectation standards: <ol style="list-style-type: none"> 1) p. 122 Develop a Model: Students can work with other groups to compare and contrast their models, provide constructive feedback, and replace or incorporate a different sphere into their models and explain new interactions between the spheres. 2) p. 126 Describe and Graph Water Data: Students can determine additional ways to display the data, be challenged to display data in an original graph of their choice, and present original graphs to classmates for analysis. 3) p. 152 Obtain and Combine Information: Have students work together to find a person in the community who is active in conservation, prepare a list of interview questions they could ask, conduct the interview, and summarize what they have learned. |
| Struggling Learners | <ul style="list-style-type: none"> • Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook to use with Investigations, Science in a Snap, Think Like a Scientist, and Think like an Engineer. • Pair with higher ability learners when appropriate. • Allow for small groups and mini-lessons with teacher. • Vary roles in heterogeneous groups to allow for different learning styles. • For Reading Support, use Reading Connection: Determine Word Meaning activities on pp. 99 (prefixes <i>atmo-</i>, <i>geo-</i>, <i>hydro-</i>, <i>bio-</i>), 103 (<i>condense</i>, <i>evaporate</i>), 115 (<i>erode</i>, <i>deposit</i>), 125 (<i>reservoir</i>), 133 (<i>deforestation</i>, <i>vegetation</i>), and 149 (<i>hydroelectric</i>). • p. 107 for Extra Support, ask: How is Earth's biosphere different from the geosphere, hydrosphere, and atmosphere? • P. 113 for Extra Support, have students make a word map about ocean ecosystems, and draw three other circles, and write in the names of the ecosystems on p. 113. • Reading Support: p. 105 Guide students in understanding how two or more main ideas of a text are supported by key details. • Reading Support: p. 107, 109 Guide students in explaining the relationships or interactions between living things in the biosphere, and among Earth's systems using text information. • Reading Support: p. 11 Guide students in summarizing the procedure in <i>Investigate</i>. • Reading Support: p. 113, 135 Guide students in determining main ideas of text and how they are supported by details. • Reading Support: p. 117, 119, 139, 141 Guide students in quoting accurately from the text when explaining what the text says explicitly. |
| English Language Learners | <ul style="list-style-type: none"> • p. 99: vocabulary activities for <i>hydrosphere</i>, <i>geosphere</i>, <i>biosphere</i>, <i>atmosphere</i> • p. 109: vocabulary activities for <i>monsoon</i> • p. 119: complete sentence frames using <i>weather</i> and <i>landform</i> content from lesson • p. 125: vocabulary activities for <i>wetland</i>, <i>landform</i>, <i>underground</i>, <i>groundwater</i> • p. 129: classification activity for <i>renewable</i> and <i>nonrenewable resources</i> • p. 137: concept map activities for <i>pollutants</i>, <i>fertilizers</i>, <i>waste</i>, <i>detergents</i>, <i>oil</i>, <i>humans impact on water</i>, <i>dam streams</i>, <i>irrigate crops</i>, <i>waste from home</i> • p. 147: sentence completion activities for <i>leaves</i>, <i>stems</i>, <i>twigs</i>, <i>dust</i>, <i>ash</i>, <i>smoke</i>, <i>brick</i>, <i>concrete</i>, <i>steel</i>, <i>asphalt</i> • p. 149: vocabulary activities for <i>solar energy</i>, <i>solar panels</i>, <i>renewable energy</i>, <i>nonrenewable energy</i>, <i>wind turbines</i>, <i>dams</i> |
| Special Needs Learners | <ul style="list-style-type: none"> • Use Reading and Vocabulary Support Activities listed under Struggling Learners and ELL. • Refer to IEPs for modifications • Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook • Provide copies of written notes for studying and reviewing purposes • Provide vocabulary definitions and study guides for assessments well ahead of time • Simplify written responses by providing sentence starters, fill-ins, partially completed diagrams, or selected responses as needed • Provide reading support as specified in IEP |

- Modify Investigations, Science in a Snap, Think Like a Scientist, and Think Like an Engineer by chunking and shortening expected responses and tasks
- Provide small-group and individual instruction as needed

Interdisciplinary Connections

Indicators:

ELA/Literacy:

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-ESS3-1)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS3-1)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-ESS2-2),(5-ESS3-1)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-ESS3-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1),(5-ESS2-2)

Mathematics:

MP.2 Reason abstractly and quantitatively. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)

MP.4 Model with mathematics. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1)

Integration of 21st Century Skills

Indicators:

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Understand and use technology systems.

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

Select and use applications effectively and productively.

- 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue. 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.

- 8.1.2.C.1 Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
- 8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.

Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

- 8.1.5.E.1 Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions

- 8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

The characteristics and scope of technology.

- 8.2.5.A.1 Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
- 8.2.5.A.2 Investigate and present factors that influence the development and function of a product and a system.

The core concepts of technology.

- 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.

The relationships among technologies and the connections between technology and other fields

- 8.2.5.A.4 Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
- 8.2.5.A.5 Identify how improvement in the understanding of materials science impacts

The cultural, social, economic and political effects of technology.

- 8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

The effects of technology on the environment.

- 8.2.5.B.2 Examine systems used for recycling and recommend simplification of the systems and share with product developers.
- 8.2.5.B.3 Investigate ways that various technologies are being developed and used to reduce improper use of resources.

The role of society in the development and use of technology.

- 8.2.5.B.4 Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.B.5 Explain the purpose of intellectual property law.

The attributes of design.

- 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.3 Research how design modifications have led to new products.

The application of engineering design.

- 8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.C.5 Explain the functions of a system and subsystems.

The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

- 8.2.5.C.6 Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
- 8.2.5.C.7 Work with peers to redesign an existing product for a different purpose.

Apply the design process.

- 8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Use and maintain technological products and systems.

- 8.2.5.D.3 Follow step by step directions to assemble a product or solve a problem.
- 8.2.5.D.4 Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
- 8.2.5.D.5 Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.

Assess the impact of products and systems.

- 8.2.5.D.6 Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
- 8.2.5.D.7 Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.

Unit 4: Earth Science Part 2: Space Systems: Stars and the Solar System

Unit Description: In this Earth Science unit, students will study Earth in its relationship to the moon, sun, and other stars in the universe. They will learn that Earth exerts a gravitational force on objects which pulls them towards the planet's center. They will understand that the sun is a star which appears brighter and larger than other stars because of its distance from Earth. Students will learn that the Earth, sun, and moon move in a system, and that it is this relationship that causes observable patterns such as shadows, day and night, and seasonal appearance of stars. They will think and act as scientists when they support an argument with evidence, data, or models and represent data in graphical displays.

Unit Duration: One Marking Period: MP4 (38 days)

16 lessons (about 27 days) broken into 3 sections by standard (at the end of each section is included a Performance Expectation lesson):

Section 1: PS2.B: Types of Interactions

Section 2: ESS1.A: The Universe and Its Stars

Section 3: ESS3.C: Earth and the Solar System

Plus 6 days for review/assessment of Disciplinary Core Ideas:

Quiz 1: Sections 1 and 2

Quiz 2: Section 3

Unit Test: Sections 1-3

**Optional: Up to 5 days for Supplemental Reading Lessons in Ladders:
Earth Science: *Exploring Above and Beyond***

Desired Results

Standard(s): Students who demonstrate understanding can:

5-PS2-1.

Types of Interactions

Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]

5-ESS1-1.

The Universe and its Stars

Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]

5-ESS1-2.

Earth and the Solar System

Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]

Understandings:

Students will understand that...

Types of Interactions:

- *The gravitational force exerted by Earth is directed downward towards Earth's center.*
- *Scientists use data, evidence, or models to support an argument.*

The Universe and its Stars:

- *The sun is a star that appears larger and brighter than other stars because it is closer.*
- *Stars range greatly in their distance from Earth.*
- *Differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.*
- *Scientists use data, evidence, or models to support an argument.*

Earth and the Solar System:

- *The Earth, sun, and moon move in space as a system. This causes observable patterns.*
- *Earth rotates on its axis once every 24 hours to cause the day/night cycle.*
- *The apparent motion of the sun across the sky is caused by Earth's rotation.*
- *Earth's orbit around the sun causes observable patterns such as:*
 - *shadows over time*
 - *the sequence of seasons over time*
 - *the positions of the stars at different times of the year*
- *Scientists represent data in graphical displays to reveal patterns that indicate relationships.*
- *The moon's rotation on its axis and orbit around Earth causes the same side to always face Earth.*
- *The moon's orbit around Earth causes patterns of moon phases.*
- *The Earth's rotation causes the apparent movement of the moon across the sky.*

Essential Questions:

- Why do objects fall towards Earth?
- How do scientists support an argument?

- What is a star?
- Why does the sun seem brighter and larger than other stars in the sky?

- How do Earth, the moon, and the sun move as a system?
- Why do the sun, other stars, and moon appear to change positions in the sky?
- What causes observable patterns such as shadows, day/night, seasons, positions of stars throughout the year, and moon phases?
- How and why do scientists represent data in graphical displays?

Indicators: DISCIPLINARY CORE IDEAS**PS2.B: Types of Interactions**

The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)

ESS1.A: The Universe and its Stars

The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)

ESS1.B: Earth and the Solar System

The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)

Assessment Evidence

Performance Tasks:

Investigate Lessons: Students will practice performance tasks in cooperative groups engaging in scientific inquiry.

- Lesson 71 (page 156) Investigate: Gravity
 - Gather data to support an argument that the gravitational force exerted by Earth on objects is directed down.
- Lesson 74 (page 162) Investigate: Apparent Brightness
 - Investigate to show that the apparent brightness of a light-emitting object varies with distance from the observer
 - Use data from the investigation to support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.
- Lesson 77 (page 168) Sunlight and Shadows:
 - Demonstrate that the rotation of earth about an axis causes observable changes in patterns of shadows over time
 - Collect and record information using tools, including a meterstick and a clock.
- Lesson 79 (page 172) Graph Hours of Daylight
 - Represent data in a graph to reveal patterns of seasonal changes in the length of day and night.
- Lesson 84 (page 182) Moon Phases
 - Collect and analyze data to identify sequences and predict patterns of change in the observable appearance of the moon over time.
 - Collect information about the moon's phases by making detailed observations.

Think Like a Scientist: Students will develop a model, provide evidence, & identify materials cooperatively using inquiry, providing evidence, analyzing data and drawing conclusions. All information will be recorded in Interactive Science Notebook and evaluated based on Teacher and Student Rubrics.

- Lesson 81 (page 176) Represent Data
 - Represent data in a graphical display that reveals the patterns of change in the seasonal appearance of some stars in the night sky.
 - Use the graphical display to describe patterns of Stars.

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook
- Science in a Snap (Lesson 73, 75, 76,)
- Science Career (Lesson 85, p. 184)
- Quizzes
- Unit Tests

Benchmarks: Benchmarks will be administered twice during the school year (at the end of Marking Period 2 and 4). The benchmark at the end of Marking Period 2 will include concepts from Physical and Life Science. The benchmark at the end of Marking Period 4 will include concepts from Earth Science.

Learning Plan

Section 1: Types of Interactions NJSL PS2.B

Lesson 70 (p. 154) Gravity on Earth

NJSL PS2.B: Types of Interactions:

Engage: SW tap prior knowledge by recalling experiences on a roller coaster and explaining what force they think pulls the coaster towards Earth.

**Interactive Science Notebook
Poster Board**

Access to the internet

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| <p><i>The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.</i> (5- PS2-1)</p> <p>Objective: Students will be able to describe the gravitational force of Earth acting on an object near Earth.</p> <p>1 day</p> | <p>Explore: SW preview lesson by observing photo and explaining what is pulling the skydiver toward Earth and whether or not they think gravity is the same everywhere on and surrounding Earth; SW set reading purpose: describe Earth's gravitational force; read pp. 154-155.</p> <p>Explain: SW use the text to define gravity, understand the concept of "down" and tell how they think gravity affects Earth's major systems.</p> <p>Elaborate: 1) SW research the speed a rocket must attain to escape gravity, the effects of gravity in space, and how it affects the return of a rocket to Earth. 2) SW explain where they think force of gravity is greater – sea level or mountain top.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • What is gravity? • Why does a skydiver fall toward Earth? • Contrast how the force of Earth's gravity acts on a skydiver and on a satellite in space. Which is greater? Explain. | |
| <p>The following lesson will demonstrate level of mastery for Goal 4:</p> | <p>Use goal and scale to monitor and assess.</p> | |
| <p>*Lesson 71 (p. 156) <u>INVESTIGATE:</u> Gravity</p> <p>NJSLS 5-PS2-1.: Types of Interactions: <i>Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]</i></p> <p>Objective: Students will be able to gather data to support an argument that the gravitational force exerted by Earth on objects is directed down.</p> <p>2 days to include Elaborate</p> | <p>Engage: SW tap prior knowledge by recalling what gravity is and what causes leaves to fall in the photo on p. 156-157.</p> <p>Explore: Read pp. 156-157 together and guide students through investigation.</p> <p>Explain: SW share observations and conclusions.</p> <p>Elaborate: 1) SW tell if force of gravity stops when an object lands on the ground 2) SW investigate whether a dropped golf ball or ping pong ball hits ground first.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • Did your predictions support your results? Why do you think they were the same or different? • Support an argument: Use evidence from your investigation to support an argument that the force of Earth's gravity on an object is directed down. | <p>Interactive Science Notebook</p> <p>For groups of 4: Unsharpened pencil, eraser, coin, crumpled paper, rubber ball, safety goggles for all</p> |
| <p>Lesson 72 (p. 158) Earth, Sun, and Moon</p> <p>NJSLS PS2.B: Types of Interactions: <i>The gravitational force of Earth acting on an object near Earth's surface pulls</i></p> | <p>Engage: SW tap prior knowledge by thinking about how the earth, moon, and sun move in space and how they are related.</p> | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |

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| <p><i>that object toward the planet's center. (5- PS2-1)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> Describe how the Earth, sun, and moon move in space and as a system Relate gravitational force to the motions of Earth, the sun, and moon in space. <p>1 day</p> | <p>Explore: SW preview lesson and explain what they think arrows in illustration represent; SW set reading purpose: describe how Earth, the sun, and the moon interact in space; read pp. 158-159.</p> <p>Explain: Use the text to connect movements of earth, sun, and moon, describe them as a system, and define gravitational force.</p> <p>Elaborate: SW research how Earth's revolution varies from 365 days and how it is accounted for.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> What is revolution? Tell why and how Earth, the moon, and the sun revolve. Gravitational force is related to mass. Infer which has a greater gravitational pull on Earth – the sun or the moon. Explain. | |
| <p>Section 2: The Universe and its Stars NJSLS ESS1.1</p> | | |
| <p>Lesson 73 (p. 160) Our Star- The Sun</p> <p>NJSLS ESS1.A: The Universe and its Stars: <i>The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> Recognize that the sun is a star that appears larger and brighter than other stars because it is the star closest to Earth. Understand that stars range greatly in their distance from Earth. <p>2 days to include Elaborate</p> | <p>Engage: SW tap prior knowledge by sharing experiences with star observation and star names.</p> <p>Explore: SW preview lesson and explain why they think the sun is so much brighter than the other stars and what stars are made of; SW set reading purpose: describe how the sun appears in the sky compared to other stars; read pp. 160-161.</p> <p>Explain: SW contrast the sun with other stars, describe the brightness of stars, and investigate to understand how distance affects perception of size (Science in a Snap activity).</p> <p>Elaborate: 1) SW research and illustrate sizes and colors of stars 2) SW research and diagram the sun's layers</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> What is a star? Why does the sun seem to be brighter and larger than other stars in the sky? | <p>Interactive Science Notebook</p> <p>Access to internet</p> <p>Science in a Snap: Each group of 4 needs a round object such as a soccer ball, metric ruler</p> |
| <p>The following lesson will demonstrate level of mastery for Goal 5:</p> | <p>Use goal and scale to monitor and assess.</p> | |
| <p>*Lesson 74 (p. 162) INVESTIGATE: Apparent Brightness</p> <p>NJSLS 5-ESS1-1.: The Universe and its Stars: <i>Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]</i></p> <p>Objective: Students will be able to</p> | <p>Engage: SW tap prior knowledge by explaining why some stars appear brighter than others.</p> <p>Explore: Read pp. 162-163 together and guide students through investigation.</p> <p>Explain: SW share observations and conclusions by answering discussion questions.</p> <p>Elaborate: Ask: How do you think stars that are different distances from Earth and with different brightness might appear?</p> | <p>Interactive Science Notebook</p> <p>For groups of 4: 3 penlights, tape, tissue paper, meterstick</p> |

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| <ul style="list-style-type: none"> Investigate to show that the apparent brightness of a light-emitting object varies with distance from the observer Use data from the investigation to support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. <p>1 day</p> | <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> Describe the brightness of the model stars in Trial 1. Which of the model stars in Trial 2 could represent the sun? Explain. Support an argument: Why can stars with the same brightness appear dimmer or brighter than they actually are? Use your observations to support your argument. | |
| <p>QUIZ #1: This is a good place to quiz the following Disciplinary Core Ideas:</p> <p>Section 1: PS2.B: Types of Interactions</p> <p>Section 2: ESS1.A: The Universe and its Stars</p> <p>2 days for review and quiz</p> | | |
| <p>Section 3: Earth and the Solar System NJSLS ESS1.2</p> | | |
| <p>Lesson 75 (p. 164) Day and Night</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> Explain that Earth rotates on its axis once every 24 hours to cause the day/night cycle Demonstrate that Earth rotates on its axis once every 24 hours to cause the day/night cycle. <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling spinning on ice or on a merry-go-round.</p> <p>Explore: SW preview diagram of Earth on p. 164 and explain shading and lines; SW set reading purpose: explain and demonstrate that Earth rotates on its axis once approximately every 24 hours causing day and night; read pp. 164-165.</p> <p>Explain: SW explain that Earth rotates on its axis which causes day and night and demonstrate it.</p> <p>Elaborate: SW research how much day/night cycle can vary.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> How does Earth's rotation on its axis cause day and night? Which time period is closer to the scientific meaning of a day – the time period between sunrise and sunset or the 24-hour time period between one sunrise and the next sunrise? | <p>Interactive Science Notebook</p> <p>Science in a Snap activity: Each group of 2 needs a globe that rotates, masking tape, a flashlight</p> |
| <p>Lesson 76 (p. 166) Apparent Motion</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to</p> | <p>Engage: SW tap prior knowledge by recalling what seems to happen when a vehicle is stopped next to their bus and it starts to move forward.</p> <p>Explore: SW preview the lesson and photo of amusement park to recognize it is about motion; SW set reading purpose: explain the apparent motion of the sun across the sky; read pp. 166-167.</p> <p>Explain: SW use the text to define apparent movement and explain how Earth's rotation causes the apparent motion of the sun.</p> | <p>Interactive Science Notebook</p> <p>For Science in a Snap: Each group of 2 needs a directional compass, outdoor landmark- such as tall, thin tree, a flagpole, or a basketball hoop mounted on a pole.</p> |

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| <ul style="list-style-type: none"> • Explain what causes the apparent motion of the sun across the sky • Demonstrate the different positions of the sun at different times of day. <p>2 days to include Science in a Snap</p> | <p>Elaborate: SW explore shadows by completing the Science in a Snap activity.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • How are real and apparent motions different? • Why do the sun, other stars, and the moon appear to change positions in the sky? • You are on the ground. You see a plane moving across the sky. Does the plane show real or apparent motion? Explain. | |
| <p>* Lesson 77 (p. 168) INVESTIGATE: Sunlight and Shadows</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Demonstrate that the rotation of earth about an axis causes observable changes in patterns of shadows over time • Collect and record information using tools, including a meterstick and a clock. <p>2 days: since shadow observation needs to occur each hour throughout the day, you may want each class to take their own time's data and share across the grade; Elaborate activities from previous lessons or shadow videos can be used to fill-in any extra time</p> | <p>Engage: SW tap prior knowledge by defining shadow and how they change in length.</p> <p>Explore: Read pp. 168-169 together and guide students through investigation.</p> <p>Explain: Once all data has been recorded (2nd day), SW share results and answer questions about relationship between shadow length and position and the sun.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • What patterns in length and movement did you observe with the shadows? • Did your results support your predictions? How is the sun's position related to the position and length of the shadows? | <p>Interactive Science Notebook</p> <p>Access to internet</p> <p>For groups of 4: Marble-size lump of clay, poster board, unsharpened pencil, colored pencil, masking tape or rocks, meterstick</p> |
| <p>Lesson 78 (p. 170) Revolution and Seasons</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to recognize that the orbit of Earth around the sun causes observable patterns such as the sequence of seasons over time.</p> <p>2 days to include extra time for understanding and supporting videos</p> | <p>Engage: SW tap prior knowledge by sharing favorite season and reason why. Tally and display results.</p> <p>Explore: SW preview the lesson and compare and contrast photos; SW set reading purpose: describe how Earth's revolution around the sun results in patterns of changes in seasons over time; read pp. 170-171.</p> <p>Explain: SW use the text to identify causes of seasons and describe each.</p> <p>Elaborate: SW research to compare and contrast seasons in area and draw conclusions.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • What causes seasons? • Beginning with winter, name the seasons in the correct order. • Describe how the number of hours of daylight changes with the seasons. | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>The following lesson will demonstrate level of mastery for Goal 6: Use goal and scale to monitor and assess.</p> | | |

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| <p>*Lesson 79 (p. 172) INVESTIGATE: Graph Hours of Daylight</p> <p>NJSLS 5-ESS1-2.: Earth and the Solar System: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]</p> <p>Objective: Students will be able to represent data in a graph to reveal patterns of seasonal changes in the length of day and night.</p> <p>2 days to include Elaborate</p> | <p>Engage: SW tap prior knowledge by recalling previous learning of seasons and during which season Northern Hemisphere experiences greatest and fewest daylight hours.</p> <p>Explore: Read pp. 172-173 and guide students through the investigation.</p> <p>Explain: SW compare graphs, note patterns, and draw conclusions.</p> <p>Elaborate: SW research to graph and compare the number of daylight hours in cities closer to the equator with those in the investigation. Use diagram on p. 171 to explain phenomenon.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • Which months have the greatest and least average number of daylight hours? • Use your graphed data to describe how the average number of daylight hours changes from month to month in Chicago. | <p>Interactive Science Notebook</p> <p>For each student: Graph paper</p> |
| <p>Lesson 80 (p. 174) Earth's Orbit and the Night Sky</p> <p>NJSLS ESS1.B: Earth and the Solar System: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</p> <p>Objective: Students will be able to describe how Earth's orbit around the sun causes observable patterns in the positions of the stars at different times of the year.</p> <p>1 day</p> | <p>Engage: SW tap prior knowledge by recalling how and why the stars appear to move across the sky through the night.</p> <p>Explore: SW preview the lesson and photo to explain what changes occur due to Earth's revolution around the sun; SW set reading purpose: describe the observable patterns in the positions of the stars at different times of the year; read pp. 174-175.</p> <p>Explain: SW use the text to define and describe constellations and analyze changes through the year.</p> <p>Elaborate: Research, draw, and describe constellations which are currently visible in the night sky in area.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • Why are most stars visible only at night? • Why do some constellations seem to change during the year? | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>Lesson 81 (p. 176) THINK LIKE A SCIENTIST: Represent Data</p> <p>NJSLS 5-ESS1-2.: Earth and the Solar System: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]</p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Represent data in a graphical display that reveals the | <p>Engage: Set the scene by having students recall from previous lessons how Earth's rotation and revolution affect view of the stars.</p> <p>Explore: SW preview lesson to identify the different ways they have learned to represent data and think of other ways to represent graphical displays.</p> <p>Explain: SW analyze diagram on p. 177, choose a constellation, and draw a series of 3 illustrations. Compare with others.</p> <p>Elaborate: SW identify a constellation that is easily seen in season they are currently experiencing. SW describe its</p> | <p>Interactive Science Notebook</p> |

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| <p>patterns of change in the seasonal appearance of some stars in the night sky.</p> <ul style="list-style-type: none"> Use the graphical display to describe patterns of stars. <p>2 days</p> | <p>pattern of movement and its relation to other stars.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> Describe the movement of each of the four constellations in the diagram. What pattern do you notice that is the same for all these constellations? | |
| <p>Lesson 82 (p. 178) Moon Motions</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to describe the moon's motions, including rotation, orbiting of Earth, and apparent movement across the sky.</p> <p>2 days to include Elaborate and supportive videos</p> | <p>Engage: SW tap prior knowledge by sharing observations about the moon in our sky.</p> <p>Explore: SW preview the lesson and photos to explain how the moon looks different; SW set reading purpose: describe the motions of the moon; read pp. 178-179.</p> <p>Explain: SW use the text to describe the moon's motion.</p> <p>Elaborate: 1) SW find out how long it takes moon to rotate and explain how it relates to the same side always facing earth. 2) Demonstrate moon's motion.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> Describe the difference between the terms rotate and revolve. Tell about the two types of motion of Earth's moon. Explain why the moon seems to move across the sky and why its shape seems to change during the month. | <p>Interactive Science Notebook</p> |
| <p>Lesson 83 (p. 180) Moon Phases</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> Explain why moon phases occur Describe the pattern of the moon's phases <p>2-3 days to study phases</p> | <p>Engage: SW tap prior knowledge by sharing what they know about the moon.</p> <p>Explore: SW preview the lesson and photos to describe how the moon's appearance changes; SW set reading purpose: identify and sequence the phases of the Earth's moon; read pp. 180-181.</p> <p>Explain: SW describe the moon's phases, explain why they occur, and sequence them.</p> <p>Elaborate: Analyze the moon's phases.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> Name eight phases of the moon, beginning with the new moon. Tell how the moon seems to change shape as it goes from new moon to full moon, and from full moon back to new moon. Explain why the moon seems to change its shape during the month. | <p>Interactive Science Notebook</p> |
| <p>*Lesson 84 (p. 182) <u>INVESTIGATE:</u> Moon Phases</p> <p>NJSLS ESS1.B: Earth and the Solar System: <i>The orbits of Earth around</i></p> | <p>Engage: SW tap prior knowledge by recalling what they have learned about Earth's moon and how it changes.</p> | <p>Interactive Science Notebook</p> <p>For groups of 3: Craft stick or pencil, foam ball</p> |

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| <p><i>the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</i></p> <p>Objective: Students will be able to</p> <ul style="list-style-type: none"> • Collect and analyze data to identify sequences and predict patterns of change in the observable appearance of the moon over time. • Collect information about the moon's phases by making detailed observations. <p>2 days</p> | <p>Explore: Read pp. 182-183 together and guide students through investigation.</p> <p>Explain: SW share observations and match drawings; SW conclude what causes patterns of change in moon's observable appearance.</p> <p>Elaborate: Complete the circle activity to help students understand what the moon would look like over the period of a month to an observer in space.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • In step 4, did you move in a clockwise or in a counterclockwise direction to produce the phases of the moon in the observable sequence that matches the moon data on p. 182? • If the moon is in the phase numbered 14, what phase will it be in the next day? In two weeks? In one month? | <p>lamp with 60-watt bulb (for class), masking tape</p> |
| <p>Quiz #2 This is a good place to quiz the following Disciplinary Core Idea:</p> <p>Section 3: ESS1.B: Earth and the Solar System 2 days for review and quiz</p> | | |
| <p>*Lesson 85 (p. 184) SCIENCE CAREER: Astrobiologist and Science Educator</p> <p><i>NJSLS Scientific knowledge assumes an order and consistency in natural systems.</i></p> <p>Objective: Students will be able to connect the concepts of astronomy with the career of an astrobiologist and science educator</p> <p>1-2 days</p> | <p>Engage: SW tap prior knowledge by recalling movies they have watch about space beings visiting Earth.</p> <p>Explore: SW preview the lesson and tell what they think an astrobiologist does; SW set reading purpose: describe the career of an astrobiologist; read pp. 184-187.</p> <p>Explain: SW define astrobiologist, describe an astrobiologist's work, and find out more about being one.</p> <p>Elaborate: 1) SW research other careers involving astrobiology and present findings 2) SW find out more about exoplanets and present.</p> <p>Evaluate: "Wrap It Up!" In ISN</p> <ul style="list-style-type: none"> • What is an astrobiologist? • Why is science communication important? | <p>Interactive Science Notebook</p> <p>Access to Internet</p> |
| <p>UNIT 4 TEST</p> <p>Disciplinary Core Ideas for Space Systems: Stars and the Solar System Sections 1-3</p> <p>2 days for review and test Nat Geo Test Questions # 39-56</p> | | |

Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

Unit 4: EARTH SCIENCE GOAL 4

(Resource p. 156 Investigate: Gravity)

Standard: 5-PS2-1: Types of Interactions

Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: “Down” is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]

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| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Design an investigation to test whether a lighter or heavier object falls faster. Make a prediction, perform the test, use your results to make an argument, and use evidence from the investigation to support your argument. |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Using data, evidence, or models, support the argument that the force of Earth's gravity on an object is directed down. |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Explain why objects fall towards Earth. Define <i>gravity</i>. In a given activity, identify the argument and identify the support for the argument. |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

Unit 4: EARTH SCIENCE Goal 5

(Resource p. 162 Investigate: Apparent Brightness)

Standard: 5-ESS1-1: The Universe and its Stars

Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]

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| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Design an investigation to argue that stars with <u>different</u> brightness may appear dimmer or brighter than they actually are due to their distances from Earth. Make a prediction, conduct the investigation, and use data, evidence, or models from the investigation to support the argument. |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Use data, evidence, or models to support the argument that stars with the <u>same</u> brightness appear dimmer or brighter than they actually are due to their distances from the Earth. |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Explain why the sun appears much larger and brighter than other stars. Describe <i>apparent brightness</i>. In a given activity, identify the argument and identify the support for the argument. |
| 1.0 | With help, partial success at level 2.0 content and level 3.0 content: |
| 0.0 | Even with help, no success |

Unit 4: EARTH SCIENCE Goal 6

(Resource p. 172 Investigate: Graph Hours of Daylight)

Standard: 5-ESS1-2.: Earth and the Solar System

Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]

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| 4.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Analyze differences of seasonal changes in daylight hours in different locations. Research the daylight hours of a location close to the equator. Graph the data and use it to describe the changes in daylight over time. Compare this data to the location farther from the equator. Use information from both graphs to describe differences. Explain the reason for this phenomenon. |
| 3.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Represent data in a graph to reveal patterns of seasonal changes in the length of day and night in a specific location. Use information from the graph to describe the changes of daylight hours over time. |
| 2.0 | <p>Students will be able to:</p> <ul style="list-style-type: none"> Describe how the number of daylight hours changes with the seasons. Explain why daylight hours change in the Northern and Southern Hemispheres through the seasons. Explain what causes seasons. Explain what causes the repeated pattern of day and night. Create and interpret different types of graphs (bar, line, circle), and identify the titles, ranges, and what the numbers represent. Explain any patterns they reveal. |
| 1.0 | <p>With help, partial success at level 2.0 content and level 3.0 content:</p> |
| 0.0 | <p>Even with help, no success</p> |

Unit Modifications for Special Population Students

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| <p>Advanced Learners</p> | <ul style="list-style-type: none"> Allow students to work independently through Investigations, "Think Like a Scientist", and "Think Like an Engineer" activities. Use the "Elaborate" sections of the lesson to extend student thinking. Some "Elaborate" activities can be extended over several days or used as long-term independent or small group projects, to demonstrate higher-level understanding of each of the following performance expectation standards: <ol style="list-style-type: none"> p. 156 Support an Argument: Students can extend the investigation by predicting which hits the ground first when dropping two objects at the same time, testing prediction, and explaining results. p. 162 Support an Argument: Students will design an investigation to argue that stars with <u>different</u> brightness may appear dimmer or brighter than they actually are due to their distances from Earth. Students will make a prediction, conduct the investigation, and use data, evidence, or models from the investigation to support the argument. p. 172 Represent Data in Graphical Displays: Students can: Analyze differences of seasonal changes in daylight hours in different locations. Research the daylight hours of a location close to the equator. Graph the data and use it to describe the changes in daylight over time. Compare this data to the location farther from the equator. Use information from both graphs to describe differences. Explain the reason for this phenomenon. |
| <p>Struggling Learners</p> | <ul style="list-style-type: none"> Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook to use with Investigations, Science in a Snap, Think Like a Scientist, and Think like an Engineer. Pair with higher ability learners when appropriate. Allow for small groups and mini lessons with teacher. Vary roles in heterogenous groups to allow for different learning styles. For Reading Support, use Reading Connection: Determine Word Meaning activities on p. 159 (<i>revolve, revolution, gravitational force</i>) and p. 181 (<i>waxing, waning</i>). p. 187 for Extra Support, have pairs of students look up definitions for <i>biologist, chemist, astronomer, and physicist</i>, and write a sentence describing work of each. Reading Support: p. 155, 171 Guide students in quoting accurately from the text when explaining what the text says explicitly. Reading Support: p. 161 Guide students in drawing on information from multiple print or digital sources as they research. |

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| | <ul style="list-style-type: none"> • Reading Support: p. 165 Have students use the text to explain some of the interactions that result in the phenomena we know as day and night. • Reading Support: p. 167,179 Guide students in understanding how two or more main ideas of a text are supported by key details. • Reading Support: p. 169 Guide students in summarizing the procedure in <i>Investigate</i>. • Reading Support: p. 183 Guide students in explaining the interactions that caused the appearance of phases on the foam ball. |
| English Language Learners | <ul style="list-style-type: none"> • Unit Vocabulary: <i>gravity, gravitational force, revolve, revolution, star, solar system, apparent brightness, rotate, rotation, axis, constellation, apparent motion</i> • p. 187: Vocabulary activities for <i>astrobiologist, scientific communication, studies, survive, work, won, present, biologist, chemist, physicist, engineer</i> |
| Special Needs Learners | <ul style="list-style-type: none"> • Use Reading and Vocabulary Support Activities listed under Struggling Learners and ELL. • Refer to IEPs for modifications. • Refer to "Learning Assessment Masters" for pre-made charts for interactive science notebook. • Provide copies of written notes for studying and reviewing purposes. • Provide vocabulary definitions and study guides for assessments well ahead of time. • Simplify written responses by providing sentence starters, fill-ins, partially completed diagrams, or selected responses as needed. • Provide reading support as specified in IEP. • Modify Investigations, Science in a Snap, Think Like a Scientist, and Think Like an Engineer by chunking and shortening expected responses and tasks • Provide small-group and individual instruction as needed. |

Interdisciplinary Connections

Common Core State Standards Connections:

ELA/Literacy -

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-PS2-1),(5-ESS1-1)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS1-1)

RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (5-ESS1-1)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-PS2-1),(5-ESS1-1)

W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1),(5-ESS1-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)

Mathematics -

MP.2 Reason abstractly and quantitatively. (5-ESS1-1),(5-ESS1-2)

MP.4 Model with mathematics. (5-ESS1-1),(5-ESS1-2)

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-ESS1-1)

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)

Integration of 21st Century Skills

Indicators:

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Understand and use technology systems.

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

Select and use applications effectively and productively.

- 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue. 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.

- 8.1.2.C.1 Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
- 8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.

Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

- 8.1.5.E.1 Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions

- 8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

The characteristics and scope of technology.

- 8.2.5.A.1 Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
- 8.2.5.A.2 Investigate and present factors that influence the development and function of a product and a system.

The core concepts of technology.

- 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.

The relationships among technologies and the connections between technology and other fields

- 8.2.5.A.4 Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
- 8.2.5.A.5 Identify how improvement in the understanding of materials science impacts

The cultural, social, economic and political effects of technology.

- 8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

The effects of technology on the environment.

- 8.2.5.B.2 Examine systems used for recycling and recommend simplification of the systems and share with product developers.
- 8.2.5.B.3 Investigate ways that various technologies are being developed and used to reduce improper use of resources.

The role of society in the development and use of technology.

- 8.2.5.B.4 Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.B.5 Explain the purpose of intellectual property law.

The attributes of design.

- 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.3 Research how design modifications have led to new products.

The application of engineering design.

- 8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.C.5 Explain the functions of a system and subsystems.

The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

- 8.2.5.C.6 Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
- 8.2.5.C.7 Work with peers to redesign an existing product for a different purpose.

Apply the design process.

- 8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Use and maintain technological products and systems.

- 8.2.5.D.3 Follow step by step directions to assemble a product or solve a problem.
- 8.2.5.D.4 Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
- 8.2.5.D.5 Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.

Assess the impact of products and systems.

- 8.2.5.D.6 Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
- 8.2.5.D.7 Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.