Washington Township School District

The mission of the Washington Township Public Schools *is to provide a safe educational environment for all students to attain the skills and knowledge specified in the New Jersey Core Curriculum Content Standards at all grade levels so as to ensure their full participation in our global society as responsible, self-directed, and civic-minded citizens.*

Course Title:	**Science**
Grade Level(s):	**5**

Duration:	*Full Year:*		*Semester:*		*Marking Period:*	**2-3**
Course Description:	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 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: • 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:	Weighted Categories: 60% Major Assessments 40% Minor Assessments					
Primary Resources:	**National Geographic Learning/Cengage Learning** ***Exploring Science***					

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

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Under the Direction of:	Linda Thomas and Gretchen Gerber

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BOE Approval: _____

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

Taught 1st Half of Marking Period 2
20 days total (includes 22 lessons, 3 quiz/review days, 1 unit review day and 1 test day
Supplemental Reading Lessons in Ladders: Physical Science: *The Sinking of the Titanic, The World's Ocean*

Unit Description: In this Physical Science Unit, students will use investigation, observation and research to study matter. They will explore physical states and properties of matter as well as characteristics of each. They will study how matter can change phases through heating, cooling, and dissolving. They will understand that matter has always existed and will always exist in one form or another and that regardless of any physical or chemical change, the amount of matter is conserved. Students will think like scientists as they develop models, measure and graph quantities, and conduct their own investigations.

Desired Results

Standard(s): Students who demonstrate understanding can:

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.] [Asse*ssment 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, but even matter that cannot be seen still exists and can be detected by other means.
- Matter can exist in different states.
- Matter can be identified based on a variety of properties, such as hardness, color, reflectivity, magnetism, electrical conductivity, thermal conductivity, solubility, heating, and cooling
- The amount (weight) of matter is conserved when it changes form, even when it seems to vanish.
- Matter can undergo a chemical change, which is different than a physical change.
- When two or more substances are mixed, a new substance with different properties may be formed.
- Regardless of what reaction or change in matter occurs, the total weight does not change.

Essential Questions:

- What is matter?
- How does matter change physical states and how are these states different?
- How can I develop a model to prove that matter is made of particles too small to be seen?
- How can we use physical properties to identify matter?
- What is the Law of Conservation of matter?
- How can I provide evidence that matter is conserved, even after heating, cooling, and mixing?
- What is the difference between a physical change and a chemical change?
- What evidence shows that a chemical reaction has occurred?
- How can I prove that a new substance forms when some materials are mixed?
- How can I prove that the matter is conserved during a chemical reaction?

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 in 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

Performance Expectations: Think Like a Scientist: Students will develop a model, provide evidence, & identify materials cooperatively using science inquiry, 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 Periods 2 and 3. The benchmark at the end of Marking Period 2 will include concepts from Unit 1 Physical Science and Unit 4 Earth: Space Science. The benchmark at the end of Marking Period 3 will include concepts from Unit 2 Life Science and Unit 3 Earth: Systems Science.

Learning Plan		
Lesson and Duration	**Activities**	**Supplemental Materials**
<u>DAY 1: Lessons 1,2,3 MATTER</u> Lesson 1 (pp. 4-5) Matter Lesson 2 (pp. 6-7) States of Matter Lesson 3 (pp. 8-9) Investigate Matter Use *Lesson 3: Investigate Matter* to facilitate discussion of content in lessons 1-2. To save time, students can dissolve their own salt, but will observe black paper drops that were previously set up and evaporated. ***Advanced PREP: p. 9 For each group of 4, place drops of salt water on black paper and allow to completely dry/evaporate prior to lesson (2-3 hours in the sun or overnight); for more dramatic results, use more salt than recommended in text*** ***NJSLS PS1.A** Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means* **Objective: Students will be able to** • **define matter as having mass and taking up space and describe matter as consisting of particles** • **compare and contrast the properties of solids, liquids, and gases** • **infer that a solution contains particles too small to see**	**Engage**: • Phenomenon: show short video: Ice to Vapor in 25 Seconds! https://www.youtube.com/watch?v=UbZLTrDjwa8 • While viewing, students discuss how water is changing; students name physical states of matter and characteristics of each; students name solids, liquids, and gases they encountered today. **Explore:** • Hold up cup of water and salt. Tell them each is matter. Ask: In which state is the salt? the water? Tell students everything around us is matter. Ask: How do we define matter? Have students read pp. 4-5 to define *matter* and *mass* in notebook (ISN). Then have students use pp. 6-7 to diagram the properties of solids, liquids, and gases. • Pass out cups of water, salt, spoons, and hand lenses to each group. Ask: How do we know this water and salt are matter? (We can prove that each takes up space and has mass.) Say: Today we will investigate what happens when we mix matter. What will happen when we stir the salt into water? Will it still be matter? Students write claims in ISN. • SW dissolve the salt in the water, make observations, and discuss results. Ask: Is the salt still there, even if we cannot see it? How can we prove the particles of salt are still there? SW write ideas in their ISN. • Have students read pp. 8-9 to learn: How can you detect materials that have been dissolved in water? Tell students you already completed Steps 2-3 of this investigation before class. Pass out the black paper with evaporated salt water. SW examine with hand lenses and explain results. **Explain:** • BIG IDEA/STANDARD: Explain that matter is made up of particles too small to be seen. Even if matter cannot be seen, it still exists and can be detected by other means. Small particles we cannot see are called atoms. Atoms are building blocks of molecules. Molecules are building blocks of all matter. **Elaborate:** • Read Science in a Snap on p. 7. How does blowing up a balloon prove that air is matter? How does it prove that matter is made of particles too small to be seen? **Evaluate:** "Wrap it Up!" 1) Choose an example of matter in the classroom. Explain how you know it is matter using the definition. 2) Recall the Ice to Vapor video from the beginning of class. Using what you learned on pp. 6-7, explain how the water particles changed when going from solid (ice), to liquid, to vapor (gas). 3) Explain how the results of the investigation provide evidence that matter is made of particles too small to be seen. (What happened to the water when mixed in the salt and how did we prove it was still there?) HOMEWORK: Study the vocab from lessons 1-3: definitions of matter and mass, the properties of liquids, solids, and gases, and the idea that matter is made up of particles too small to be seen. Video: Crash Course Kids 3.1 What's Matter? https://www.youtube.com/watch?v=ELchwUIlWa8 Video: Crash Course Kids 3.2 (Part)icles of Your World https://www.youtube.com/watch?v=npv74D2MO6Q The Matter Song: https://www.youtube.com/watch?v=jQ5VbjWetUE	Interactive Science Notebook (ISN) Access to Internet Salt Plastic Cup – about 9 oz. Water Plastic Teaspoon Dropper Black Construction Paper Hand Lens

DAY 2-3: Lesson 4 **DEVELOP A MODEL** **(**pp.10-11) ***NJSLS PS1.1*** *Develop a model to describe that matter is made of particles too small to be seen.* **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**. 2 Days Day 1: Prepare and develop concept Day 2: Construct and evaluate	**Engage**: • Review ideas presented on pages 4-9. Remind students they have evidence that supports the concept that matter is made of particles too small to be seen from the saltwater investigation. Review how that model proves that saltwater has invisible particles that still exist. • Spend a few minutes discussing the Science in a Snap from p. 7. Demonstrate this to the class and explain how this is another model that provides evidence that matter has particles too small to be seen. • Explain that even the diagram on p. 5 of the grain of sand magnified 100 times proves that matter is made up of particles too small to be seen. • Ask, "How can you develop a different model to explain that matter is made of particles too small to be seen?" Record and answer in ISN. **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: • Does air contain particles? • Are some too small to be seen? Create a table showing numbers of students who get it and who did not. If time, students can modify the model. **Explain:** Students will analyze results and revise the model. Students will share the model. **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. **Evaluate:** In ISN: • 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. Students/teacher will use rubric provided on p. 11b to evaluate the model	Interactive Science Notebook (ISN) 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
Day 4: Lessons 5-7 **HARDNESS** Move very quickly through Lesson 5 (pp. 12-13) Properties of Matter and Lesson 6 (pp. 14-15) Hardness. Spend majority of time on Lesson 7 (pp. 16-17) Investigate Hardness. ***NJSLS PS1.A*** *Measurements of a variety of properties can be used to identify materials* **Objectives: Students will be able to** • **identify seven physical properties of matter** • **describe hardness and order the degrees of hardness of various materials**. • **determine the hardness order of minerals by**	**Engage**: Place an object in a bag and ask a student to close eyes, feel the object, and describe its properties. Have others guess what it is. Discuss that scientists use physical properties to describe matter. Lessons 5-6 **Explore:** Preview pp. 12-15 and set reading purpose: to describe some physical properties of matter. **Explain:** In their ISN, students will define physical properties, identify each of the 7, describe an object in surroundings using at least 5 physical properties, and read pp.14-15 to define hardness. Ask students to complete Science in a Snap p.15 in small groups and order the objects according to hardness. Lesson 7 **Explore:** Lead cooperative groups through the "Investigate" on pages 16-17. Have students create a chart in ISN to record their findings and refer to later to analyze and draw conclusions. **Explain:** Discuss evidence found that helped students order objects from softest to hardest. Ask students to identify the principle they used. **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. **Evaluate:** "Wrap It Up!" In ISN • Put mineral samples in order from softest to hardest and list in ISN. • What evidence was gathered to determine this order? • Where would gold and pyrite fit in your order since gold is slightly harder than a fingernail and pyrite is harder than the nail.	Interactive Science Notebook (ISN) Plastic spoon Aluminum washer Copper Penny Steel paper clip Rubber Band Orange crayon Chart/ data table Access to internet 4 different minerals labeled: calcite, quartz, talc & feldspar Iron nail Copper penny Hand lens Safety goggles

performing scratch tests		
<u>Day 5: Finish Lesson 7 if needed and complete Lesson 8 Magnetism (pp. 18-19)</u> ***NJSLS PS1.A*** *Measurements of a variety of properties can be used to identify materials* **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.**	**Engage**: Inquire as to the experience students have regarding magnets and what they may be attracted to. **Explore:** Review pp. 18-19 and ask what's happening to the train in the picture. Ask probing questions, set a purposed and read pp. 18-19. **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." **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. **Evaluate:** "Wrap It Up! In ISN • Provide examples of something magnetic and identify what kind of metal it most likely contains. • How can the property of magnetism be tested? HOMEWORK: Study vocab from lessons 5-8.	Eraser Iron Steel Nail Paper Clip Iron or Steel washer Penny Glass marble Bar magnet Access to internet
<u>Day 6: Lesson 9 (pp. 20-21) and 10 Electrical Conductivity (pp. 22-23)</u> ***NJSLS PS1.A:*** *Measurements of a variety of properties can be used to identify materials.* **Objective: Students will be able to classify matter based on its ability to conduct or insulate electrical energy.**	**Engage**: Ask students to name some objects around the classroom and at home that have electrical cords and describe the cords. Tell students that today they will investigate another property called electrical conductivity. Have them read the first 2 sentences on p. 22. Ask what vocabulary they will need to perform this investigation conductor and insulator. Have them read pp. 20-21 to: • 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. **Explore:** Guide students through the "Investigate" and read pp. 22-23 together. **Explain:** Help students/ groups make claims/ predictions, gather/record evidence, & draw conclusions **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 panel and have students draw a schematic of the flow of electricity in the building. **Evaluate:** "Wrap It Up!" In ISN • Did your results support your predictions? EXPLAIN • Classify the materials as conductors or insulators	Interactive Science Notebook Access to internet 1 light bulb in holder 1 D cell in holder 2 15 cm. Wires Materials to test such as: • Nail • Aluminum foil • Index card • Eraser • Craft stick • Paper clip • Washer • Cork • Plastic button • Safety Goggles
<u>Day 7: Lesson 11 Thermal Conductivity (pp. 24-15)</u> ***NJSLS PS1.A****:* *Measurements of a variety of properties can be used to identify materials* **Objective: Students will be able to classify matter based on its ability to conduct or insulate thermal energy.**	**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 ISN. **Evaluate:** "Wrap It Up!" ISN • 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	Metal spoon Plastic spoon Foam or Ceramic cup ISN Access to internet
<u>Day 8: Lesson 12 Solubility (pp. 26-27)</u> ***NJSLS PS1.A:*** *Measurements of a variety*	*Also discuss mixture vs. solution during this lesson, since Mixtures Lesson 16 is eliminated. **Engage**: Have students recall what a bottle of salad dressing looks like unshaken and shaken and compare to a bottle of sweet tea. They both have same ingredients, but they are different. How? Discuss.	4 identical plastic cups Sand Plastic spoon Sea salt Lemon Juice

of properties can be used to identify materials **Objective: Students will be able to determine the solubility of various materials.**	**Explore:** Preview pp. 26-27. Have students construct a table in ISN to record evidence and data, encourage students to make claims, guide groups through the "Investigate." **Explain:** • Solution- a mixture of two or more substances evenly distributed • 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 ISN • Did your results support your claim? Explain. • Identify each material used in this investigation as soluble or insoluble in water. HOMEWORK: Study vocab from lessons 9-12.	Vegetable Oil Clock or Stop Watch Safety goggles Warm Tap Water (teacher) Graduated Cylinder (teacher) Interactive Science Notebook, ISN Access to Internet
<u>Day 9: Lessons 13 Heating (pp. 28-29) and 14 Cooling (pp. 30-31)</u> ***NJSLS PS1.A****: The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish.* **Objective: Students will be able to** • **define and identify the boiling and melting point of water; describe how boiling affects the state of water.** • **define condensation and describe how cooling of water can change its state.**	**Engage**: Ask students to recall instances when they observed the effects of heat on ice cubes and liquid water and of liquid water appearing to come from nowhere. Discuss why. **Explore:** Preview pp. 28-29 and discuss what they think is happening. Explore heating and read to describe the effect of heating matter. Preview photo on pp. 30-31. Identify state of matter. What changes occurred to cause this? Set a purpose for reading pp. 28-29. **Explain:** Define key terms: melting point, boiling point, physical change, and conservation of matter. Explain the effects of heating. Explain condensation. Compare and contrast condensation and freezing. **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. Extend thinking about cooling. Think about cooling and cold South Pole. Why do mustaches freeze? Think and discuss. What experiences have students had that supports the idea that exhaled air contains water vapor? **Evaluate:** "Wrap It Up!" ISN: • 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? • 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 **Video:** Vacation or Conservation (Of Mass): Crash Course Kids #23.1 https://www.youtube.com/watch?v=3lHHOiTdmK4 HOMEWORK: Study vocab Lessons 1-14 for quiz.	Interactive Science Notebook Access to Internet Reproduced table from TM pp. 29
<u>Day 10: Review and Quiz</u> ***NJSLS PS1.A*** *Structure and Properties of Matter* • Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means • The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish. • Measurements of a variety of properties can be used to identify materials	Review vocabulary and concepts from Lessons 1-14 Complete Quiz #1 on Lessons 1-14 (If needed and time permits, finish lessons and/or Elaboration extension activities.)	

<u>Day 11 (set up) and part of Day 12 (after freezing) and again after melting/evaporation: Lesson 15 Changing States of Water (pp. 32-33)</u> ***NJSLS PS1.A****: The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish* **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.**	**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? **Explore:** Guide students through the investigation on pp. 32-33. **Explain:** Discuss observations and conclusions after freezing and a few days later, after melting and evaporating. **Evaluate:** "Wrap It Up!" In ISN • Did your results support your claim? • Which properties of water stayed the same? Which changed? • Explain the differences in bags after step 3 (freezing) • ** A few days later, after water ice melts and/or evaporates, students can add to their conclusions. • Draw conclusions about how your findings demonstrate conservation of matter. **Elaborate:** How could one design an investigation to show that water hasn't really vanished, but changed state. Discuss or write in ISN.	Per group: 2 resealable plastic sandwich bags Masking tape Graduated cylinder Pitcher of water Balance Gram masses ISN
Omit Lesson 16; however, discuss definition of mixture vs. solution when completing Lesson 12 on solubility.		
<u>Days 12-13: Lesson 17 Provide Evidence</u> **NJSLS 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.* **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.**	**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? **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. **Explain:** Analyze and interpret the data. Did it support the Law of Conservation of Matter? Share your results. **Elaborate:** Follow up investigation with another but focus on a different physical change and different ways to organize data. **Evaluate:** "Wrap It Up!" In ISN • Identify the type of data you collected for your graph. • Describe the physical changes you observed. • Explain how you used your data as evidence.	Choose from various liquids and solids such as: • Water • Lemon juice • Vegetable oil • Ice • Clay sand • Sugar cubes • Baking soda • Salt • Paper • ISN
<u>Day 14: Lessons 18 Chemical Changes (pp. 38-39), 19 Signs of a Chemical Change (pp. 40-41), and Chemical Reactions (pp. 42-43)</u> ***NJSLS PS1.B:*** *When two or more different substances are mixed, a new substance with different properties may be formed. No matter what reaction or change in*	*Begin with the Investigation Lesson 21, and use it as the purpose for learning more about chemical changes in Lessons 18-19. **Engage**: Students will recall instances when they observed when one material changed to another, particularly when cooking. What happens? **Explore:** SW read Investigation on pp. 42-43. Have them discuss what they think a chemical reaction is and how it differs from a physical change based upon the paragraph on p. 42. Students will make predictions based upon their understanding of conservation of matter. SW complete investigation and record observations and data. **Explain:** Share observations and conclusions. Have students read pp. 38-41 to gain more information about chemical changes. Set a purpose	Interactive Science Notebook Access to Internet Safety goggles Per group: 100 mL graduated cylinder Large resealable plastic bag Balance Water

properties occurs, the total weight of the substances does not change. ***NJSLS PS1.4****: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.* **Objective: Students will be able to describe chemical changes and signs of a chemical change, compare chemical changes to physical changes, and demonstrate that matter is conserved during a chemical reaction.**	for reading: define chemical change and chemical reaction, and identify signs of a chemical change in ISN. Discuss some chemical reactions observed regularly at home. How do you know? **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? **Evaluate:** "Wrap It Up!" ISN • Compare and contrast physical and chemical changes. • Describe what you observed when you added the tablet to the water in the investigation. • Infer: What evidence shows that a new substance was formed? • Draw conclusions: How do your findings demonstrate conservation of matter? HOMEWORK: Study vocab lessons 18-20 for quiz on Day 17.	Effervescent tablet Gram masses
<u>Day 15-16: Lesson 21 Identify Materials</u> ***NJSLS PS1.3:*** *Make observations and measurements to identify materials based on their properties.* **Objective: Students will be able to distinguish materials based on an analysis of their physical and chemical properties.**	**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. **Explore:** Students will plan and conduct an investigation by making predictions and recording observations as data. Students should follow steps and analyze results. **Explain:** Share results and analyze the information. **Elaborate:** If the unknown kinds of matter in your investigation were metals, how could you eliminate iron, nickel or cobalt? Explain. **Evaluate:** Interactive Science Notebook • What were the substances you identified? • How do you know?	Each group: Corn Starch Baking soda Baking powder Water Vinegar Iodine- potassium iodide solution (10 mL) Dropper 13 clear 8 oz plastic cups 4 plastic spoons 10 cm x 10 cm squares of foil ISN Safety goggles
<u>Day 17: Quiz#2</u> **Chemical Reactions** ***PS1.B:*** • *When two or more different substances are mixed, a new substance with different properties may be formed.* • *No matter what reaction or change in properties occurs, the total weight of the substances does not change.*	Review vocabulary and concepts from Lessons 18-21 Complete Quiz #2 on Lessons 18-21 (If needed and time permits, finish lessons and/or Elaboration extension activities.)	
<u>Day 18: Lesson 22 Research Scientist</u> ***NJSLS*** *Science investigations use a variety of tools and techniques.* **Objective: Students will be able to identify the goal of research scientist**	**Engage**: Ask students what they think a research scientist does and what kinds of problems he/ she tries to solve. **Explore:** Preview pp. 46-47 and ask probing questions. Have students read in order to gain exposure to the career of a research scientist. **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? **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	ISN Access to internet

Albert Yu-Min Lin and the tools he employs to reach that goal	**Evaluate:** In ISN • What is Albert Yu-Min Lin trying to locate? • What tools does he use in his research? • Explain crowdsourcing.	
Day 19: Review for unit test **Day 20: Unit 1 Test** **Grade Interactive Science Notebooks**		

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard 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.]	
4.0	**Students will be able to:** • Perform an internet search for images related to atoms, chemical solutions, or solar system models to discover how models are used to depict very large or small particles of matter. Based on the research, evaluate the models on their ability to demonstrate that matter is made of particles to small to be seen. Indicate which model is superior and why.
3.0	**Students will be able to:** • Develop a model to provide evidence that matter is made of particles too small to be seen. • Construct, test, and evaluate the validity of the model. Make revisions if necessary.
2.0	**Students will be able to:** • Explain how a model, such as an inflated balloon or saltwater solution, shows that matter is made of particles too small to be seen. • Use a model to successfully communicate a concept. • Compare and contrast the arrangement and activity of particles in solids, liquids, and gases. • Describe matter as consisting of particles. • Define matter and 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 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.]	
4.0	**Students will be able to:** • Analyze other groups' investigation designs to determine which best provides evidence of matter conservation after a physical change. Justify and debate reasons for determination.
3.0	**Students will be able to:** • Choosing from a variety of solid and liquid materials, plan and conduct an investigation 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. • Organize, analyze, and interpret data from the investigation. • Write a conclusion that provides evidence that matter was conserved after heating, mixing, or cooling.
2.0	**Students will be able to:** • Describe how matter changes states. • Define physical change. • Understand the law of conservation of matter. • Measure mass. • Use evidence to support a claim.
1.0	**With help, partial success at level 2.0 content and level 3.0 content**
0.0	**Even with help, no success**

Standard 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.]	
4.0	**Students will be able to:** • Using their own research, design an investigation to test unknown metals based upon properties. Include relevant physical and chemical properties for testing each metal.
3.0	**Students will be able to:** • Through investigation, observe and measure physical and chemical properties of unlabeled powdered materials (color, reaction to vinegar, solubility, and reaction to iodine). • Analyze results of the investigation to identify each material. Use evidence to write a conclusion.
2.0	**Students will be able to:** • Make and record observations during an investigation. • Use measurement tools such as scales, microscopes, and timers. • Use data from an investigation to answer a question. • Describe physical and chemical changes. • Define properties of hardness, reflectivity, magnetism, electrical conductivity, thermal conductivity, and solubility.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard 5-PS1-4: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	
4.0	**Students will be able to:** • Using tools such as narrow-mouth bottle, and balloon, and a scale, design an investigation to test whether mixing vinegar and baking soda follows the principle of the conservation of matter.
3.0	**Students will be able to:** • Through investigation, observe and collect data to determine if the mixture of water and an effervescent tablet results in a chemical reaction. Use evidence from the investigation to prove a new substance has formed and matter was conserved.
2.0	**Students will be able to:** • Define chemical change and chemical reaction. • Identify the signs of a chemical reaction. • Understand that total mass of matter is conserved after a chemical change.
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." • Use the "Elaborate" sections of the lesson to extend student thinking
Struggling Learners	• 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
English Language Learners	• 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 • 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. 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	• 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
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

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

Taught 1st Half of Marking Period 3
19 days total (includes 20 lessons, 2 quiz/review days, 1 unit review day and 1 test day
Supplemental Reading Lessons in Ladders: Life Science: African Savanna, The Galapagos Islands

Unit Description: In this Life Science Unit, students will use investigation, observation, and research to understand that energy in animals' food was once energy from the sun that was captured by plants in the chemical process of photosynthesis. They will understand that plants get what they need for growth chiefly from air and water and that food provides animals with the materials they need to maintain body warmth and for motion. Finally, students learn that matter cycles among plants, animals, decomposers, and the environment. They will think like scientists when they use evidence to support an argument and develop models to represent events and design solutions.

Standard(s):
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 for growth
- 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 co-exist to make up an ecosystem
- 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

Essential Questions:

- What are the three things plants need to live and grow?
- How do plants use energy from the sun?
- What problems can be solved with 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?
- What are the conditions organisms need 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?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
Investigate Lessons- Students will practice performance tasks in cooperative groups engaging in scientific inquiry. • Lesson 5 (page 60) Investigate Hydroponics- Determine if plants can grow without soil • Lesson 16 (page 82) Investigate Interactions in a model pond- Observe interactions among organisms in an ecosystem and describe the flow of energy 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 6 (page 62) Support an argument- Use evidence to support that plants get the materials they need for growth from mainly water and air • Lesson 9 (page 68) Compare and Contrast- Use food chains to compare the pathway of energy from the sun through organisms • Lesson 10 (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 • Lesson 19 (page 88) Animals Invade – show how a species can invade an ecosystem and how scientists use other species to control it	*Students will demonstrate their understandings through:* • Science Notebook • Research Scientist (Lesson 20) • Quizzes • Unit Test

Benchmarks: Benchmarks will be administered twice during the school year, at the end of Marking Periods 2 and 3. The benchmark at the end of Marking Period 2 will include concepts from Unit 1 Physical Science and Unit 4 Earth: Space Science. The benchmark at the end of Marking Period 3 will include concepts from Unit 2 Life Science and Unit 3 Earth: Systems Science.

Learning Plan		
PS3.D: Energy in Chemical Processes and Everyday Life **LS1.C: Organization for Matter and Energy Flow in Organisms**		
<u>Lesson 1 (p. 50) What Plants Need, Lesson 2 (p.52) How Plants Get Energy, and Lesson 3 (p. 54) Materials for Plant Growth</u> ***NJSLS PS3.D****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)* **Objective: Students will be able to:** • **list three main things plants need to live and grow** • **identify the source of energy that plants use to make the food they need to survive** • **explain that the energy that plants use to live and grow was once energy from the sun and** • **describe the process of photosynthesis** • **explain that plants get the materials they need for growth chiefly from air and water**	**Lesson 1** **Engage**: Recall an experience with a houseplant and describe conditions. **Explore:** Preview the lesson on pp 50-51 discuss. Students will read pp 50-51 to identify what plants need. **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. **Evaluate:** "Wrap It Up!" In ISN • 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 **Lesson 2** **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. **Explain:** Define photosynthesis and chlorophyll. Describe the process of photosynthesis. **Evaluate:** "Wrap It Up!" ISN • 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. **Lesson 3** **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. **Explain:** Explain how plants get carbon dioxide and water; describe the role of mineral nutrients. **Elaborate:** Learn more about the relationship between plants and the amount of carbon dioxide in the air and how it affects the total amount of carbon dioxide in the air. **Evaluate:** "Wrap It Up!" ISN • 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?	Science Notebook Access to additional print resources IE: the library Access to the internet
<u>Day 2: Lesson 4 (page 52) Growing Crops</u> ***NJSLS LS1.C:*** *Plants acquire their material for growth chiefly from air and water.* **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**	**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!" ISN • 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?	Interactive Science Notebook Access to internet

Day 3: Lesson 5 (page 60) Hydroponics INVESTGATE ***NJSLS LS1.1:*** *Support an argument that plants get the materials they need for growth chiefly from air and water.* **Objective Students will be able to conduct an investigation to determine if plants can grow without soil.** 20 minutes for setup today, 5 minutes a day for the next 3-4 days for observation, 20 minutes for conclusion in a week. Use remainder of today's class for Elaboration activities/videos from previous lessons.	**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. **To be done in a week after observations:** **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!" ISN Conclusion • How did the plant change during the period you were watching it? • Use evidence from your investigation to support an argument that plants can grow without soil. • 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?	For groups: 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 Interactive Science Notebook
Day 4 Lesson 6 (p. 62) Support an Argument **NJSLS LS1.1:** *Support an argument that plants get the materials they need for growth chiefly from air and water.* **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.**	**Engage**: Set the scene and have students reflect on plant study, photosynthesis and hydroponics. Discuss. **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. **Explain:** Look for evidence in places other than text (text features: captions, images, charts/ tables, etc.) Mini lesson on quoting text properly. Evaluate & compare evidence among peers. Construct an argument and generalize information like a scientist. **Elaborate:** In science notebook teams expand activity by exploring the role of chlorophyll in food making process. **Evaluate:** Teacher and Student rubrics for the following: • List materials and evidence • Compare • Construct an argument • Generalize	Interactive Science Notebook Paper
Day 5: Lesson 7 (p. 64) Why Animals Need Food **NJSLS LS1.C:** *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.* **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.**	**Engage**: Recall experiences feeding pets and discuss. **Explore:** Observe pictures on pp 64-65 and predict lesson; share. Read pp 64-65 to find out why animals need food. **Explain:** Describe how an elephant gets and uses energy in food; describe how animals use the materials and energy in food; refer to text. **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. **Evaluate:** "Wrap It up!" ISN • 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-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?	Interactive Science Notebook Access to internet
Day 6 Lesson 8 (p. 66) Desert Food Chains and Lesson 9 (p.68) Compare and Contrast ***NJSLS LS1.C:*** *Food provided animals with the material they need for body repair and growth*	**Engage**: Draw a picture of a necklace or bracelet and direct attention to the links. Discuss the importance of the links. **Lesson 8** **Explore:** Preview the lesson; observe diagram on pp 66-67. Ask probing questions and discuss. Read pp 66-67 to find out how energy	Interactive Science Notebook Access to Internet *crayons/colored pencils

and the energy they need to maintain body warmth and for motion. ***NJSLS PS3.D****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)* **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 and compare the pathway of energy from the sun through the organisms in two different environments**	from the sun is transferred from one organism to another in a food chain. **Explain:** Describe food chains; identify producers and consumers in a food chain; describe the flow of energy through a desert food chain. **Evaluate:** "Wrap It Up!" ISN • What is a food chain? • How do producers and consumers each obtain the energy thy need to live and grow? • Could producers live without consumers? Explain. **Lesson 9** **Explore:** What does it mean to compare and contrast? Discuss and create a chart comparing and contrasting various animal. **Explain:** Compare and contrast food chains by using teams. Read pp 68-69 and observe diagrams; look at titles of two food chains. **Elaborate:** Research organisms in different food chains and record findings in ISN to compare and contrast with lesson. Discuss and share. **Evaluate:** "Wrap It Up!" ISN • What is the original source of energy for both food chains? • How are the producers and consumers in the pond like tose in the rain forest? How are they different?	
<u>Day 7: Quiz#1</u> ***NJSLS LS1.C:*** *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.* ***NJSLS PS3.D****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)*	Review vocabulary and concepts from Lessons 1-9 Complete Quiz #2 on Lessons 1-9 If time permits, write a conclusion for Lesson 5 Hydroponics form Day 3 (15 minutes).	
<u>Day 8: Lesson 10 (p. 70) Use Models</u> **NJSLS PS3.1** *Use models to describe that the energy in animal's food was once energy from the sun.* **Objective: Students will be able to use a model to describe that energy in animals' food was once energy from the sun.**	**Engage**: Recall past learning; ask probing questions. **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. **Explain:** Research an environment and use 3 different sources. Record resources in ISN. Assemble your model; analyze and revise your model; present your model. **Elaborate:** Partners will work together to compare and contrast their research and models. **Evaluate:** Answer in ISN and use rubrics • 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?	Print and digital resources for research Access to internet Crayons/ colored pencils
LS2.A Interdependent Relationships in Ecosystems **LS2.B Cycles of Matter and Energy Transfer in Ecosystems**		
<u>Day 9: Lesson 11 (p. 72) Desert Food Web</u> ***NJSLS LS2.A*** *The food of almost any kind of animal can be traced back to plants. Organisms are related in food*	**Engage**: Reflect on a picture of a web; describe and point out numerous connections **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.	Interactive Science Notebook Access to internet

webs in which some animals eat plans 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. **Objective: Students will be able to describe the flow of energy from the sun through the organisms in a food web.**	**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 **Elaborate:** Modify a dessert food web; Replace with a horned lizard. Research and record finding in ISN. 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 ISN. **Evaluate:** "Wrap It Up!" ISN • Explain how energy flows through a food web. • 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?	
<u>Day 10: Lesson 12 (p. 74) Decomposers</u> *NJSLS LS2.A 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 plans 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.* **Objective: Students will be able to describe the role of decomposers in food webs and in cycles of matter.**	**Engage**: Share observations of mushrooms growing in the wild and similar questions to probe for background. **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. **Explain:** Define decomposers, fungi, and bacteria; describe the role of decomposers in cycles of matter. IE: consider recycling. **Elaborate:** Research different kinds of mushrooms that grow in local ecosystems; research and design compost area. **Evaluate:** Wrap It Up! ISN • 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?	Interactive science notebook Access to internet Reference books, field guides
<u>Day 11: Lesson 13 (p. 76) Cycles of Matter</u> ***NJSLS LS2.B*** *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. **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.**	**Engage**: Define "cycle" in own words; give examples. **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. **Explain:** Describe the cycles of matter; describe the carbon dioxide-oxygen cycle; describe the nitrogen cycle. Explain interactions. **Elaborate:** Research how humans affect the carbon dioxide-oxygen cycle of matter. **Evaluate:** "Wrap It Up!" • 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, plant, rabbit. Draw a diagram with arrows that put the organisms in the correct order. Begin with nitrogen in the soil.	Interactive Science Notebook Access to internet

Day 12 Lesson 14 (p. 78) and Lesson 15 (p. 80) Grassland Populations and Communities ***NJSLS LS2.A*** *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 plans 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.* **Objective: Students will be able to explain that organisms can survive only in environments in which their particular needs are met and describe the levels of organisms that make up an ecosystem.**	**Lesson 14** **Engage**: Ask students to think of what they need to live. What are basic needs. Discuss. **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. **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. **Evaluate:** "Wrap It Up!" ISN • 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. **Lesson 15** **Engage**: Discuss "Community" and what is needed. **Explore:** Observe the photo on pp 80-81 for patterns. Read to learn how individuals, populations, and communities make up an ecosystem. **Explain:** Define species and population. Describe communities; describe a healthy ecosystem. **Elaborate:** Research prairie dog communities; record in ISN and prepare a classroom model of a grassland food web. **Evaluate:** "Wrap It Up!" • List three levels of organisms that make up a community • Compare how population is different from community.	Interactive Science Notebook Access to Internet
Day 13: Lesson 16 (p. 82) Interactions in a Model Pond INVESTIGATE **NJSLS PS3.D** *The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter.* **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.** 1 day to build;7 days to observe	**Engage**: Discuss producers, consumers, and decomposers that might exist in a pond and the source of energy. **Explore:** Guide students through investigation on pp 82-83. Students will construct a table, make claims, gather evidence and draw conclusions. **After 7 days:** **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. **Elaborate:** Continue to observe for additional days and look for changes and record in ISN. **Evaluate:** "Wrap it Up!" In ISN Conclusion • 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?	For Groups: Clear plastic bottle Sand Small rocks in a plastic cup Hand lens Elodea Snails Interactive Science Notebook Access to Internet For teacher: Sharp scissors Masking tape
Day 14: Lesson 17 (p. 84) Develop a Model **NJSLS LS2.*1*** *Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.* **Objective: Students will be able to develop a model to**	**Engage**: Recall what they learned about cycles of matter and rereading pp 76-77. **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. **Explain:** Research an ecosystem; draw information from other sources. Analyze and revise your model. Present your model. **Elaborate:** Research another important cycle and compare. **Evaluate:** In ISN • What environment did you select?	Access to internet Interactive Science Notebook Access to other reference material

describe movement of matter among plants, animals, decomposers, and the environment.	• 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?	
Day 15 Lesson 18 (p.86) Plants Invade! And Lesson 19 (p. 88) Animals Invade! ***NJSLS LS2.A*** *Newly introduced species can damage the balance of an ecosystem.* **Objective: Students will be able to describe how newly introduced species can damage the balance of an ecosystem.**	**Lesson 18** **Engage**: Ask students think of weeds and unwanted insects and how they interact with or cause problems in environments. **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. **Explain:** Describe invasive species; describe how newly introduced species can damage an ecosystem. **Elaborate:** Research an invasive plant that grows in our region and provide background and information. Record in ISN and communicate with peers. **Evaluate:** "Wrap It Up!" ISN • 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. **Lesson 19** **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. **Explain:** Identify and explain the problem and solution regarding the red imported fire ant. **Evaluate:** "Wrap It Up!" ISN • 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.	Access to internet Interactive Science Notebook
<u>Day 7: Quiz#2</u> **LS2.A Interdependent Relationships in Ecosystems** **LS2.B Cycles of Matter and Energy Transfer in Ecosystems**	Review vocabulary and concepts from Lessons 11-19 Complete Quiz #2 on Lessons 11-19	
<u>Day 17 Lesson 20 (p. 92)</u> **<u>Science Career: Conservationist</u>** **NJSLS** *Scientists study the natural and material world.* **Objective: Students will be able to describe how a conservationist studies the natural world and works with other people to save natural resources.**	**Engage**: Share experiences working to save the environment. Be specific and explain. **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. **Explain:** Describe the work of a conservationist. Reread and point out various places for students to reread and ask probing questions to check 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 ISN to share. **Evaluate:** In ISN • What is a conservationist? • What is Dr. Ovel Hinojosoa 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?	Access to internet Access to other print research material Interactive Science Notebook.

	• Are the wetlands of the Colorado River Delta important to humans? Explain.	
Day 18: Review for unit test **Day 19: Unit 1 Test** **Grade Interactive Science Notebooks**	**If time permits, have students write a conclusion for Lesson 16 Interactions in a Model Pond started Day 13**	

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard 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.]	
4.0	**Students will be able to:** • Analyze other students' models in order to choose an exemplary model based upon criteria you develop. Defend your choice using criteria.
3.0	**Students will be able to:** Research several organisms in an environment that make up a food chain. Use it to develop a model that shows energy in animal's food was once energy from the sun. Analyze, revise, and present your model.
2.0	**Students will be able to:** • Describe food chains, including producers and consumers. • Describe how energy moves from the sun to plants. • Describe how energy moves from producers to consumers. • Describe how energy moves from consumers to other consumers. • Create a model. • Conduct research.
1.0	**With help, partial success at level 2.0 content and level 3.0 content**
0.0	**Even with help, no success**

Standard 5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]	
4.0	**Students will be able to:** • Use research to construct, support, and defend an effective argument about the role of chlorophyll in the food-making process. Present and debate argument with peers.
3.0	**Students will be able to:** • Construct an effective argument by making a claim that in order to grow, plants need carbon dioxide from air and water. Cite multiple text evidence and data from investigations to support claim, including how and why plants use air and water. Evaluate, defend, and refine arguments with peers.
2.0	**Students will be able to:** • Describe photosynthesis. • Identify what plants need for growth. • Describe how plants use air, water, and nutrients. • Investigate plants growing without soil. • Collect informational evidence from a text and quote accurately from the text. • Make a claim and support it with evidence.
1.0	**With help, partial success at level 2.0 content and level 3.0 content**
0.0	**Even with help, no success**

Standard 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.]	
4.0	**Students will be able to:** • Research to analyze how water moves through an ecosystem. Create a model to show how water cycles from nonliving environment to living organisms. Present and defend your model.
3.0	**Students will be able to:** • Research several organisms that make up either a carbon dioxide-oxygen cycle or a nitrogen cycle. Use it to develop a model that shows matter moving through plants, animals, decomposers, and the environment. Analyze, revise, and present your model.
2.0	**Students will be able to:** • Describe food chains, including producers, consumers, and decomposers. • Describe how matter moves through a food chain. • Create a model. • Conduct research.
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.” • Use the “Elaborate” sections of the lessons to extend student thinking
Struggling Learners	• Refer to “Learning Assessment Masters” for premade 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 group and mini lessons with teacher • Vary roles in heterogenous groups to allow for different learning styles
English Language Learners	• Identify vocabulary site words • Use sentence frames to use vocabulary words correctly • 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	• Refer to IEP’s for modifications • Refer to “Learning Assessment Masters” for premade 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
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

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 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 Title: UNIT 3: EARTH SCIENCE: Earth's Systems

Taught 2nd Half of Marking Period 3
18 days total (includes 16 lessons, 3 quiz/review days, 1 unit review day and 1 test day
Supplemental Reading Lessons in Ladders: Earth Science: Power Up, Earth's Crazy Climate

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, and that humans are also working to protect these valuable resources.

**ADVANCED PREPARATION:
1) Gather small plants, soil, and gravel for Lesson 7: Interactions of Earth's Systems (p. 110), which occurs on Day 3

Standard(s): PERFORMANCE EXPECTATIONS
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.

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?

<table>
<tr>
<td>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.</td>
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<td>Performance Tasks:
Investigate Lessons: Students will practice performance tasks in cooperative groups engaging in scientific inquiry.
• Lesson 7 (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 15 (page 126) Investigate Graphing Water Data
• Graph the amounts and percentages of salt water and fresh water on Earth
• Lesson 26 (page 150) Investigate Using Solar Energy: Investigate how solar energy can be used to make water cleaner.

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 13 (page 112) Develop a Model
– Describe an interaction between two of Earth’s systems, or spheres
– Explain interactions demonstrated in model
• Lesson 27 (page 152) Obtain and Combine Information
– Work with a group to obtain information about ways Washington Township uses science ideas to protect Earth’s resources and environment.
– Combine information from investigation to communicate research to others.</td>
<td>Other Evidence:
Students will demonstrate their understandings through:
• Science Notebook
• Science in a Snap (Lesson 23)
• Think Like an Engineer Case Study (Lesson 24) 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</td>
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<tr>
<td colspan="2">Benchmarks: Benchmarks will be administered twice during the school year, at the end of Marking Periods 2 and 3. The benchmark at the end of Marking Period 2 will include concepts from Unit 1 Physical Science and Unit 4 Earth: Space Science. The benchmark at the end of Marking Period 3 will include concepts from Unit 2 Life Science and Unit 3 Earth: Systems Science.</td>
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LEARNING PLAN		
Earth Materials and Systems NJSLS ESS2.1		
<u>Day 1: Lesson 1 (p. 98) Earth's Major Systems, Lesson 2 (p. 100) The Geosphere, and Lesson 3 (page 102) The Hydrosphere</u> **NJSLS *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.* **Objective: Students will be able to** • **identify Earth's major systems** • **recognize that these systems interact and affect Earth's materials and processes** • **describe the geosphere and hydrosphere and explain how each interacts with other systems to affect Earth's surface materials and processes**	**Lesson 1 (quickly)** **Engage:** SW describe any personal experiences they have had with outdoor activities that involve nature. **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. **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 **Evaluate: "Wrap It Up!" In ISN** • Identify Earth's 4 major systems • Classify given items into each • Explain which systems interact when a beaver builds a dam **Lesson 2** **Engage:** Tap prior knowledge of recent earthquakes or volcanic eruptions and ask which parts of geosphere they think were involved. **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. **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. **Elaborate:** Research and diagram the layers of the Earth's interior geosphere. **Evaluate:** "Wrap It Up!" ISN • Identify two processes that take place in the geosphere. • Explain how water in hydrosphere can change geosphere. • Explain how volcanic ash in the air might affect plants and animals in biosphere **Lesson 3** **Engage:** Tap prior knowledge by having students describe what happens to puddles, snow, ice they observed in environment. **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**.** **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. **Elaborate:** Use vocab from text to diagram the water cycle **Evaluate: "Wrap It Up!" ISN** • 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.	Science Notebook Poster Board Access to the internet
<u>Day 2: Lesson 4 (p. 104) and Lesson 5 The Atmosphere</u> **NJSLS *ESS2.A: Earth Materials and Systems:*** *Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere*	**Lesson 4** **Engage:** Tap prior knowledge by asking students to describe today's weather. **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.	Interactive Science Notebook Access to internet

(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. **Objective: SWBAT describe the atmosphere and biosphere and explain how each interacts with other systems to affect Earth's surface materials and processes.**	**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. **Elaborate:** 1) Research layers of atmosphere and diagram 2) SW find out more about ozone layer and why today holes exist. **Evaluate: "Wrap it up!" ISN** • Identify which gas makes up the largest part of the atmosphere. • Explain how wind affects landforms. • Infer: Would you usually expect to find more water in the atmosphere over the land or the ocean? Explain. **Lesson 5** **Engage:** Tap prior knowledge by asking students to recall meaning of bio- and cite examples of life. **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. **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. **Elaborate:** Research one of Earth's biomes. **Evaluate: "Wrap It Up!" ISN** • Describe what makes up the biosphere. • Explain how animals interact with the atmosphere. • Explain how the elements of the biosphere and hydrosphere interact.	
<u>Day 3: Lesson 6 (page 108) Earth's Systems Interact and Lesson 7 (p. 110) INVESTIGATE: Interactions of Earth's Systems</u> **NJSLS *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.* **Objective: Students will be able to** • describe how the interactions of the Earth's systems result in weather patterns known as monsoons. • model the interactions of Earth's major systems and describe how the geosphere, atmosphere, hydrosphere, and biosphere interact.	**Lesson 6** **Engage:** SW tap prior knowledge by recalling how a recent heavy rainfall may have affected the land and bodies of water in the area. **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. **Explain:** Using the text, SW define monsoon, identify system interactions that cause monsoons, and describe effects. **Evaluate: "Wrap It Up!" ISN** • 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. **Lesson 7:** **Engage:** Tap prior knowledge by asking students to recall earth's systems and describe examples of how they interact with each other **Explore:** Guide students through setting up the investigation on pp. 110-111. **After 2+ Weeks of Observations:** **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. **Elaborate:** SW compare terrarium to local ecosystem. **Evaluate: "Wrap It Up!" ISN** Conclusion: • 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?	Interactive Science Notebook For groups of 4: Safety goggles Clear 2-L bottle w/ top cut off Gravel Potting soil Plastic spoon Small plants Masking tape

*Lesson 7: part of 1 day for set-up; 5-10 minutes each week for 2 weeks or more for observation		
Day 4: Review and Quiz #1 **NJSLS *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.*	Review vocabulary and concepts from Lessons 1-7 Complete Quiz #1 on Lessons 1-7 (If needed and time permits, finish lessons and/or Elaboration extension activities.)	
Day 5: Lesson 8 (p. 112): Ocean Ecosystems **NJSLS *ESS2.A: Earth Materials and Systems:*** *The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.* **Objective: SWBAT describe a variety of ecosystems and organisms in the ocean.**	**Engage:** Tap prior knowledge by having students recall what kind of ocean life they have seen at the beach. Review hydrosphere and biosphere. **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. **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? **Elaborate:** 1) SW research coral reefs, display findings, and share 2) What might happen if population of Antarctic krill were to disappear? **Evaluate: "Wrap It Up!" ISN** • 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?	Interactive Science Notebook Access to internet
Day 6: Lesson 9 (p. 114) The Ocean Shapes the Land and Lesson 10 (p. 116) The Ocean Influences Climate **NJSLS *ESS2.A*: *Earth Materials and Systems:*** *The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.* **Objective: SWBAT** • describe how the ocean shapes the land and explain the processes of erosion and deposition • describe how the ocean influences climate and explain the difference between weather and climate.	**Lesson 9** **Engage**: SW tap prior knowledge by sharing how waves move and how they affect sand on the beach. **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. **Explain:** SW use the text to review earth's systems and interactions, describe ocean currents and waves, and define erosion and deposition. **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. **Evaluate: "Wrap It Up!" ISN** • 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? **Lesson 10** **Engage**: SW tap prior knowledge by describing today's weather and the climate of the state.	Interactive Science Notebook Access to Internet

	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. **Explain:** SW define and differentiate climate and weather and connect the influence of ocean currents to weather and climate. **Elaborate:** SW research to find out more about Gulf Stream temperatures. **Evaluate: "Wrap It Up!" ISN** • 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.	
Day 7: Lesson 11 (p. 118): Landforms and Weather Patterns and **Lesson 12 (p. 120): The Atmosphere and Landforms** **NJSLS *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.* **Objective: Students will be able to** • **describe how winds and clouds in the atmosphere interact with landforms to determine patterns of weather** • **explain how processes in Earth's atmosphere interact with and change the shape of landforms.**	**Lesson 11** **Engage**: SW tap prior knowledge by recalling the effect of the ocean on climate. **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. **Explain:** SW use the text to analyze how mountains affect weather patterns and demonstrate understanding of rain shadows. **Elaborate:** SW research annual rainfall in several cities on either side of Sierra Nevada and describe trends. **Evaluate: "Wrap It Up!" ISN** • Why do clouds form near the top of a mountain range? • 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? **Lesson 12** **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. **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. **Explain:** Use the text to describe interaction of atmosphere with landforms. **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. **Evaluate: "Wrap It Up!" ISN** • 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?	Interactive Science Notebook Access to Internet
The following lesson will demonstrate level of mastery for Goal 1: Use Nat Geo rubric in TG and goal and scale to monitor and assess		
Day 8-9: Lesson 13 (p. 122): THINK LIKE A SCIENTIST: DEVELOP A MODEL **NJSLS *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*	**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. **Explore:** SW design, record plans, gather materials for, and construct their models. **Explain:** SW analyze, revise, and present models. **Elaborate:** SW compare and contrast models with other groups. **Evaluate: Teachers will use a rubric to assess student models. Students will also respond to the following:** • What is a model? • What type of model did you use to describe system interactions? Explain. • Which spheres did you show interacting in your model? How did the spheres interact? What was the result of this interaction?	Interactive Science Notebook For groups of 4: Assemble and set up areas of art materials that students choose for their models, including conceptual (posters, etc.) or physical

clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] **Objective: Students will be able to** • **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** **2 days**		(terrariums, etc.).
Day 10: Review and Quiz #2 **NJSLS *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.*	Review vocabulary and concepts from Lessons 8-12 Complete Quiz #2 on Lessons 8-12 (If needed and time permits, finish lessons and/or Elaboration extension activities.)	
The Roles of Water in Earth's Surface Processes: **NJSLS ESS2.2**		
The following lesson will demonstrate level of mastery for Goal 2: Use goal and scale to monitor and assess.		
Day 11: Lesson 14 (p. 124): Water on Earth and Lesson 15 (p. 126) Graphing Water Data **NJSLS 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.* **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** • **graph the amounts and percentages of salt water and fresh water on Earth.**	**Lesson 14 (quickly)** **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. **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. **Explain:** SW use the text to compare amounts of fresh and salt water on earth and define and describe glaciers. **Evaluate: "Wrap It Up!" ISN** • 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 **Lesson 15** **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 **Explore:** Read pp. 126-127 together and guide students through investigation. **Explain:** SW share final graphs and answer questions. **Elaborate:** 1) SW explain in what other ways they might display the data 2) SW create a circle graph for Earth's freshwater. **Evaluate: "Wrap It Up!" ISN** • Use evidence from your graph to describe the distribution of salt water and freshwater on Earth.	Interactive Science Notebook For groups of 4: Graph paper, optional: poster paper, construction paper, markers, rulers, protractors

	• Use your graph to contrast the amount of groundwater and the amount of water that is frozen in glaciers. Which reservoir contains more water? Use evidence from your graph to support your answer. • 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?	
Human Impacts on Earth's Systems: NJSLS ESS3.1		
Day 12: Lesson 16 (p. 128): Earth's Resources **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.* **Objective: Students will be able to** • **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.**	**Engage**: SW tap prior knowledge by describing things that people need in everyday life and what they have in common. **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. **Explain:** SW use the text to identify and classify natural resources. **Elaborate:** 1) SW research local natural resources 2) SW research nonrenewable resources. **Evaluate: "Wrap It Up!" ISN** • 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. *An additional interactive assessment activity can be found in the digital book.	Interactive Science Notebook Internet Access
Day 13: Lesson 17 (p. 130) Humans Impact the Land, Lesson 18 (p. 132) Humans Impact Vegetation, and Lesson 20 (p. 136): Humans Impact Water **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.* **Objective: SWBAT identify ways in which human activities affect the land, vegetation, and water sources on Earth.**	**Lesson 17** **Engage**: SW tap prior knowledge by recalling some ways humans use the land. **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. **Explain:** Use the text to discuss impact of agriculture, building, and industry. **Elaborate:** 1) SW research, illustrate, and present impact of mining 2) SW describe what impact fertilizers and pesticides might have on the land. **Evaluate: "Wrap It Up!" ISN** 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. **Lesson 18** **Engage**: SW tap prior knowledge by recalling what plant products they use every day and how. **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. **Explain:** SW use the text to identify meaning of vegetation and how humans impact it. **Elaborate:** 1) SW explain how they think deforestation affects the atmosphere 2) SW research consequences of deforestation in rainforests. **Evaluate: "Wrap It Up!" ISN** 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?	**Interactive Science Notebook** **Access to Internet**

	Lesson 20 **Engage**: SW tap prior knowledge by recalling fresh water sources on Earth and how humans use fresh water. **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. **Explain:** SW use the text to describe human activities connected with water and identify their impacts on fresh water and the ocean. **Elaborate:** SW track the amount of water they use each day for a week and explain why they should conserve. **Evaluate: "Wrap It Up!" ISN** • 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?	
OMIT Lesson 19 (p. 134): INVESTIGATE: Plants and Pollution		
Lesson 21 (p. 138): Humans Impact Air and Lesson 22 (p. 140): Humans Impact Space **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.* **Objective: Students will be able to** • **Identify ways that human activities impact air in Earth's atmosphere** • **Describe ways that people are working together to clean up the air** • **identify ways in which human activities impact space**	**Lesson 21** **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. **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. **Explain:** SW use the text to identify sources of air pollution, explain smog, and describe how humans can clean up the air. **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. **Evaluate: "Wrap It Up!" ISN** • 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. **Lesson 22** **Engage**: SW tap prior knowledge by sharing where space begins and how humans have explored it. **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. **Explain:** Use the text to describe space junk and explain the danger it causes. **Elaborate:** 1) SW create a graphic of Earth and space junk 2) research how NASA monitors and studies space junk. **Evaluate: "Wrap It Up!" ISN** • What is space junk? Give some examples. • Why might space junk be dangerous	**Interactive Science Notebook** **Internet access**
Lesson 23 (p. 142): Protecting Land, Air, and Water **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.*	**Engage**: SW tap prior knowledge by describing their experience with curbside or community recycling. **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. **Explain:** SW use text to discuss why conservation is important and ways humans can do so. **Elaborate:** SW research plastics and use as starting point for **SCIENCE IN A SNAP** activity on p. 143. **Evaluate: "Wrap It Up!" ISN** • 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.	**Interactive Science Notebook** For **SCIENCE IN A SNAP** activity: Groups of 4 need a variety of plastic containers with numbered recycling codes.

Objective: Students will be able to explain the importance of conserving Earth's resources and how recycling can help conserve resources.		
<u>*Lesson 24 (p. 144): THINK LIKE AN ENGINEER: CASE STUDY: Tower of Trees</u> **<u>NJSLS ESS3.C: Human Impacts on Earth Systems</u>***:* *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.* **Objective: Students will be able to** • **Identify the benefits of trees in an urban environment** • **Describe methods that engineers have developed for growing trees in crowded cities.**	**Engage**: SW tap prior knowledge by recalling the definition of deforestation, why humans do it, and where few trees might be found. **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. **Explain:** SW use the text to identify the problem and solution in case study and identify engineering practices used. **Elaborate:** 1) SW work in small groups to brainstorm, draw, and share their own design solution 2) SW examine New York's Central Park. **Evaluate: "Wrap It Up!" ISN** • What is a vertical forest? • How could a vertical forest improve air quality? • Do you think vertical forest towers are a good solution for your community? Explain why or why not.	**Interactive Science Notebook**
<u>Lesson 25 (p. 148): Renewable Energy Resources</u> and **<u>*Lesson 68 (p. 150): INVESTIGATE: Using Solar Energy</u>** **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.* **Objective: Students will be able to** • **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** • **investigate how solar energy can be used to make water cleaner.** Lesson 26: part of 1 day for set up; 15 minutes two days later	**Lesson 25** **Engage**: SW tap prior knowledge by describing energy resources they use every day. **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. **Explain:** SW use the text to describe the difference between renewable and nonrenewable resources. **Elaborate:** SW find out more about how solar cells or dams are used to generate electricity. **Evaluate: "Wrap It Up!" ISN** • 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? **Lesson 26** **Engage**: SW tap prior knowledge by recalling how sunlight affects water and what happens to water vapor in the atmosphere. **Explore:** Read pp. 150-151 together and guide students through the investigation. **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. **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. **Evaluate: "Wrap It Up!" ISN** • 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?	**Interactive Science Notebook** 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

Day 18: Review and Quiz #3 **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.*	Review vocabulary and concepts from Lessons 16-25 Complete Quiz #3 on Lessons 16-25 (This also may be a good day to write conclusion for Lesson 7 Systems' Interactions in the terrarium.)	
DAY 19-20: Review for and administer Unit 3 test; grade Interactive Science Notebooks		
The following lesson will demonstrate level of mastery for Goal 3: Use Nat Geo rubric and goal and scale to monitor and assess.		
Days 21-24 *Lesson 27 (p. 152): THINK LIKE A SCIENTIST: OBTAIN and COMBINE INFORMATION: **NJSLS *5-ESS3-1**.: *Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.* **Objective: Students will be able to** • **Work with a group to obtain information about ways Washington Township uses science ideas to protect Earth's resources and environment** • **Combine information from their research to communicate their results to others** **4 days**	**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. **Explore:** SW gather, analyze, and organize research about how WT protects one of the following: water, vegetation, or energy. Class will work in 3 expert groups by resource chosen **Explain:** SW prepare a summary of their findings and present to a small group of students who researched a different resource. **Elaborate:** Invite a community member who is active in conservation and protection of natural resources to speak to the class. **Evaluate: Teachers will use a rubric to assess student models. Students will also respond to the following:** • 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?	**Interactive Science Notebook** Students will work in groups of 3-4 with specific roles. Have on hand a list of local groups that work to protect and conserve resources such as energy, water, or vegetation.

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.]

4.0	**Students will be able to:** • 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	**Students will be able to:** • 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	**Students will be able to:** • Define *model*. • 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: – *geosphere, biosphere, hydrosphere, atmosphere*
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.]	
4.0	**Students will be able to:** • Generate other ways to display the data in an original graph of choice, such as a 3-dimentional 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	**Students will be able to:** • 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	**Students will be able to:** • 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.	
4.0	**Students will be able to:** • 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:** • 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:** • 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	
Advanced Learners	• 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: 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	• 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 *atmo-, geo-, hydro-, bio-),* 103 (*condense, evaporate*), 115 (*erode, deposit*), 125 (*reservoir*), 133 (*deforestation, vegetation*), and 149 (*hydroelectric*). • 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 *Investigate*. • 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	• p. 99: vocabulary activities for *hydrosphere*, *geosphere*, *biosphere*, *atmosphere* • p. 109: vocabulary activities for *monsoon* • p. 119: complete sentence frames using *weather* and *landform* content from lesson • p. 125: vocabulary activities for *wetland*, *landform*, *underground, groundwater* • p. 129: classification activity for *renewable* and *nonrenewable resources* • p. 137: concept map activities for *pollutants, fertilizers, waste, detergents, oil, humans impact on water, dam streams, irrigate crops, waste from home* • p. 147: sentence completion activities for *leaves, stems, twigs, dust, ash, smoke, brick, concrete, steel, asphalt* • p. 149: vocabulary activities for *solar energy, solar panels, renewable energy, nonrenewable energy, wind turbines, dams*
Special Needs Learners	• 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
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

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: Space Systems: Stars and the Solar System

Taught 2nd Half of Marking Period 2
18 days total (includes 16 lessons, 3 quiz/review days, 1 unit review day and 1 test day
Supplemental Reading Lessons in Ladders: Earth Science: *Exploring Above and Beyond*

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**.**

Desired Results

NJSLS Standard(s): PERFORMANCE EXPECTATIONS
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 1 (page 156) Investigate: Gravity
  - Gather data to support an argument that the gravitational force exerted by Earth on objects is directed down.
- Lesson 5 (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 8 (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 10 (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 15 (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 4, 6, 7)
- Science Career (Lesson 16, p. 184)
- Quizzes
- Unit Test

Benchmarks: Benchmarks will be administered twice during the school year, at the end of Marking Periods 2 and 3. The benchmark at the end of Marking Period 2 will include concepts from Unit 1 Physical Science and Unit 4 Earth: Space Science. The benchmark at the end of Marking Period 3 will include concepts from Unit 2 Life Science and Unit 3 Earth: Systems Science.

Learning Plan

Types of Interactions NJSLS PS2.B		
The following lesson will demonstrate level of mastery for Goal 1:	Use goal and scale to monitor and assess.	
Day 1: Lesson 1 (p. 154) Gravity on Earth and 2 (p. 156) INVESTIGATE: Gravity **NJSLS *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.]* **Objective: Students will be able to gather data to support an argument that the gravitational force exerted by Earth on objects is directed down.**	**Use Lesson 2 Investigation to drive purpose for gathering information from Lesson 1** **Engage:** SW tap prior knowledge by recalling experiences on a roller coaster and explaining what force they think pulls the coaster towards Earth. **Explore:** Read pp. 156-157. SW make predictions, complete investigation, and record observations. Share observations and results. Discuss reasons for results. SW set reading purpose for 154-155: describe Earth's gravitational force acting on an object near Earth. **Explain:** SW use the text to define gravity, understand the concept of "down" and tell how they think gravity affects Earth's major systems. Discuss where they think force of gravity is greater – sea level or mountain top.	Interactive Science Notebook Poster Board Access to the internet Interactive Science Notebook For groups of 4:

	SW use information from text and results from investigation to write the following conclusion: **Evaluate: "Wrap It Up!" In ISN** • Did your predictions support your results? Why do you think they were the same or different? • Support an argument: Use evidence from the text and your investigation to support an argument that the force of Earth's gravity on an object is directed down. **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.	Unsharpened pencil, eraser, coin, crumpled paper, rubber ball, safety goggles for all
Day 2: Lesson 3 (p. 158) Earth, Sun, and Moon **NJSLS *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)* **Objective: Students will be able to** • **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.**	**Engage:** SW tap prior knowledge by thinking about how the earth, moon, and sun move in space and how they are related. **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. **Explain:** Use the text to connect movements of earth, sun, and moon, describe them as a system, and define gravitational force. **Elaborate:** SW research how Earth's revolution varies from 365 days and how it is accounted for. **Evaluate: "Wrap It Up!" In ISN** • 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.	Interactive Science Notebook Access to Internet
The Universe and its Stars NJSLS ESS1.1		
The following lesson will demonstrate level of mastery for Goal 2:	Use goal and scale to monitor and assess.	
Day 3: Lesson 4 (p. 160) Our Star- The Sun and Lesson 5 (p. 162) INVESTIGATE: Apparent Brightness **NJSLS *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).]* **Objective: Students will be able to** • **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.**	**Use Lesson 5 Investigation to drive purpose for gathering information from Lesson 4.** **Engage:** SW tap prior knowledge by sharing experiences with star observation/star names and explaining why some stars appear brighter than others. **Explore:** Read pp. 162-163. SW complete investigation, and record observations. Share observations and results. Discuss reasons for results. SW set reading purpose for pp. 160-161: describe how the sun appears in the sky compared to other stars **Explain:** Use the text to answer the following in ISN: What is a star? Why does the sun seem to be brighter and larger than other stars in the sky? SW use this information to write a conclusion for the investigation. **Evaluate: Conclusion in ISN** • 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 investigation observations and text information to support your argument. **Elaborate:** Ask: How do you think stars that are different distances from Earth and with different brightness might appear?	Interactive Science Notebook Access to internet Science in a Snap: Each group of 4 needs a round object such as a soccer ball, metric ruler Interactive Science Notebook For groups of 4: 3 penlights, tape, tissue paper, meterstick
Day 4: QUIZ #1: Assess the following Disciplinary Core Ideas from Lessons 1-5: **PS2.B: Types of Interactions** **ESS1.A: The Universe and its Stars**		
Earth and the Solar System NJSLS ESS1.2		
Day 5: Lesson 6 (p. 164) Day and Night **NJSLS *ESS1.B: Earth and the Solar System:*** *The orbits of Earth around the sun and of the moon around Earth, together with*	**Engage:** SW tap prior knowledge by recalling spinning on ice or on a merry-go-round. **Explore:** SW preview diagram of Earth on p. 164 and explain shading and lines; SW set reading purpose:	Interactive Science Notebook

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) **Objective: Students will be able to** • **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.**	explain and demonstrate that Earth rotates on its axis once approximately every 24 hours causing day and night; read pp. 164-165. **Explain:** SW explain that Earth rotates on its axis which causes day and night and demonstrate it. **Elaborate:** SW research how much day/night cycle can vary. **Evaluate: "Wrap It Up!" In ISN** • 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?	Science in a Snap activity: Each group of 2 needs a globe that rotates, masking tape, a flashlight
<u>Day 6-7: Lesson 7 (p. 166) Apparent Motion and Lesson 8 (p. 168) INVESTIGATE: Sunlight and Shadows</u> **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)* **Objective: Students will be able to** • **Explain what causes the apparent motion of the sun across the sky** • **Demonstrate the different positions of the sun at different times of day.** • **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.** **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 time-lapse shadow videos can be used to fill-in any extra time	**1st Day Lesson 7 (Quickly):** **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. **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. **Explain:** SW use the text to define apparent movement and explain how Earth's rotation causes the apparent motion of the sun. **Evaluate: "Wrap It Up!" In ISN** • 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. **1st Day Lesson 8:** **Engage:** SW tap prior knowledge by defining shadow and how they change in length. **Explore:** SW read pp. 168-169 and complete investigation. **Next Day Lesson 8:** **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. **Evaluate: "Wrap It Up!" In ISN** • 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? **Elaborate:** SW explore apparent motion of sun by completing the Science in a Snap activity p. 167.	Interactive Science Notebook 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. Investigation groups of 4: Marble-size lump of clay, poster board, unsharpened pencil, colored pencil, masking tape or rocks, meterstick
<u>Day 8-9 Lesson 9 (p. 170) Revolution and Seasons</u> **This lesson is 2 days** to include extra time for understanding and supporting videos **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)* **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.**	**Engage:** SW tap prior knowledge by sharing favorite season and reason why. Tally and display results. **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. **Explain:** SW use the text to identify causes of seasons and describe each. **Elaborate:** SW research to compare and contrast seasons in area and draw conclusions. **Evaluate: "Wrap It Up!" In ISN** • 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.	Interactive Science Notebook Access to Internet

The following lessons (10-11) **will demonstrate level of mastery for Goal 3:** Use goal and scale to monitor and assess.		
Day 10: Lesson 10 (p. 172) INVESTIGATE: Graph Hours of Daylight **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.]* **Objective: Students will be able to represent data in a graph to reveal patterns of seasonal changes in the length of day and night.**	**Engage:** SW tap prior knowledge by recalling previous learning of seasons and during which season Northern Hemisphere experiences greatest and fewest daylight hours. **Explore:** Read pp. 172-173 and guide students through the investigation. **Explain:** SW compare graphs, note patterns, and draw conclusions. **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. **Evaluate: "Wrap It Up!" In ISN** • 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.	Interactive Science Notebook For each student: Graph paper
Day 11: Lesson 11 (p. 174) Earth's Orbit and the Night Sky and Lesson 12 (p. 176) THINK LIKE A SCIENTIST: Represent Data **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.]* **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.** • **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.**	**Lesson 11 (Quickly):** **Engage:** SW tap prior knowledge by recalling how and why the stars appear to move across the sky through the night. **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. **Explain:** SW use the text to define and describe constellations and analyze changes through the year. **Evaluate: "Wrap It Up!" In ISN** • Why are most stars visible only at night? • Why do some constellations seem to change during the year? **Lesson 12:** **Explore:** SW preview lesson to identify the different ways they have learned to represent data and think of other ways to represent graphical displays. **Explain:** SW analyze diagram on p. 177, choose a constellation, and draw a series of 3 illustrations. Compare with others. **Elaborate:** SW identify a constellation that is easily seen in season they are currently experiencing. SW describe its pattern of movement and its relation to other stars. **Evaluate: "Wrap It Up!" In ISN** • 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?	Interactive Science Notebook Access to Internet
Day 12: QUIZ #2: Assess part of the following Disciplinary Core Ideas from Lessons 6-12: ESS1.B Earth and the Solar System: Patterns		
Day 13: Lesson 13 (p. 178) Moon Motions and Lesson 14 (p. 180) Moon Phases **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)* **Objective: Students will be able to** • **describe the moon's motions, including rotation, orbiting of Earth, and apparent movement across the sky.**	**Lesson 13:** **Engage:** SW tap prior knowledge by sharing observations about the moon in our sky. **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. **Explain:** SW use the text to describe the moon's motion. **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. **Evaluate: "Wrap It Up!" In ISN** • 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. **Lesson 14:**	Interactive Science Notebook

• **Explain why moon phases occur** • **Describe the pattern of the moon's phases**	**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. **Explain:** SW describe the moon's phases, explain why they occur, and sequence them. **Elaborate:** Analyze the moon's phases (See Elaborate TG p.181) **Evaluate: "Wrap It Up!" In ISN** • 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.	
Day 14: Lesson 15 (p. 182) INVESTIGATE: Moon Phases **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)* **Objective: Students will be able to** • **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.** **2 days**	**Engage:** SW tap prior knowledge by recalling what they have learned about Earth's moon and how it changes. **Explore:** Read pp. 182-183 together and guide students through investigation. **Explain:** SW share observations and match drawings; SW conclude what causes patterns of change in moon's observable appearance. **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.** **Evaluate: "Wrap It Up!" In ISN** • 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?	Interactive Science Notebook For groups of 3: Craft stick or pencil, foam ball lamp with 60-watt bulb (for class), masking tape
Quiz #3 Assess part of the following Disciplinary Core Idea: **ESS1.B: Earth and the Solar System: THE MOON**		
Day 15: Lesson 16 (p. 184) SCIENCE CAREER: Astrobiologist and Science Educator **NJSLS** *Scientific knowledge assumes an order and consistency in natural systems.* **Objective: Students will be able to connect the concepts of astronomy with the career of an astrobiologist and science educator**	**Engage:** SW tap prior knowledge by recalling movies they have watch about space beings visiting Earth. **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. **Explain:** SW define astrobiologist, describe an astrobiologist's work, and find out more about being one. **Elaborate:** 1) SW research other careers involving astrobiology and present findings 2) SW find out more about exoplanets and present. **Evaluate: "Wrap It Up!" In ISN** • What is an astrobiologist? • Why is science communication important?	Interactive Science Notebook Access to Internet
DAY 16-17: Review for and administer Unit 4 test; grade Interactive Science Notebooks		

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

Unit 4: EARTH SCIENCE: SPACE GOAL 1 **(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.]

4.0	**Students will be able to:** • 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	**Students will be able to:** • Using data, evidence, or models, support the argument that the force of Earth's gravity on an object is directed down.
2.0	**Students will be able to:** • Explain why objects fall towards Earth. • Define gravity. • 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: SPACE Goal 2 **(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).]

4.0	**Students will be able to:** • 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	**Students will be able to:** • 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	**Students will be able to:** • Explain why the sun appears much larger and brighter than other stars. • Describe *apparent brightness*. • 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: SPACE Goal 3 **(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.]

4.0	**Students will be able to:** • 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	**Students will be able to:** • 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	**Students will be able to:** • 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	**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" 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: 1) 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. 2) 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. 3) 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.
Struggling Learners	• 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 (*revolve, revolution, gravitational force)* and *p.* 181 (*waxing, waning).* • p. 187 for Extra Support, have pairs of students look up definitions for *biologist, chemist, astronomer*, and *physicist*, 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. • 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 *Investigate*. • Reading Support: p. 183 Guide students in explaining the interactions that caused the appearance of phases on the foam ball.
English Language Learners	• Unit Vocabulary*: gravity, gravitational force, revolve, revolution, star, solar system, apparent brightness, rotate, rotation, axis, constellation, apparent motion* • p. 187: Vocabulary activities for *astrobiologist, scientific communication, studies, survive, work, won, present, biologist, chemist, physicist, engineer*
Special Needs Learners	• 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.
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

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.