Unit 1 - Structure, Properties and Interactions of Matter	Grade 5	Days - 21

Standards:
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.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances

Anchoring Question:

- How can we observe and explain how we know that matter can not be created or destroyed?

Essential Questions:

1. How can understanding the properties of matter impact our lives?
2. How can we prove that matter is neither created nor destroyed?
3. What is matter made up of?

Enduring Understandings:

- Matter is a term that applies to all of the things around us and it is made of particles that are too small to see.
- When substances are heated, cooled, or mixed the total weight before and after is always the same.
- Substances can be identified based on observable and measurable properties.
- Sometimes when two substances are mixed, each of the substances keeps its original properties and sometimes a new substance is formed.
- Matter can neither be created nor destroyed.

Storyline Narrative / Big Ideas:

This unit will focus on matter and its characteristics. Learners will be able to identify the structure of each state of matter and be able to define and describe matter based on physical traits. Additionally, students will experiment with various materials to decide whether matter can be created and/ or destroyed.

Vocabulary Words: compress, conduction, detect, dissolve, mineral, relative, solubility, substance, atom, accuracy, alternative, conserve, Kelvin, react, substance

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. -Develop a model to describe phenomena. (5-PS1-1) **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. -Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4) -Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3) **Using Mathematics and Computational Thinking** Mathematical and computational thinking in 3–5 builds on K–2 experiences and	**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. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) -Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the	**Cause and Effect -** Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4) **Scale, Proportion, and Quantity -** Natural objects exist from the very small to the immensely large. (5-PS1-1) -Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1- 2),(5-PS1-3)

progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. -Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)	atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) **PS1.B: Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) -No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)	

Consolidated Supply List:

- Hot Plate
- Mixing Bowl
- Tongs
- Masking Tape
- One Gallon Ziplock Bag (per student)
- One Straw (per student)
- Hand Lenses
- Baking Soda
- Cornstarch
- Salt
- Sugar
- Baby Powder
- Paper Cups
- Iodine
- Vinegar
- Eye Droppers
- Scale or Balance
- Chocolate for melting
- 2 Beakers
- Petri Dish
- Spoon
- Graduated Cylinder
- Balloon
- Rubberband
- Ceramic Dish

- 2 Test Tubes
- Nitrate Solution
- Sodium Hydroxide
- Small Bowl or Cup (per student)
- Cup, Mug, or Drinking glass (per student)
- Fork
- Measuring Spoon
- Food Coloring
- Epic Books subscription
- Brainpop subscription
- Newsela subscription
- Digital scales

OPTIONAL MATERIALS
- Play Do
- Measuring Cup
- 2 clear plastic or glass containers per student, approximately 2 ¼ cups in size. Make sure they are containers you can write on with marker

Episode 1
Engage/Elicit Ideas
Days: 2 days

Lessons	**Resources**
Lesson 1: Phenomenon **Gather -** Show phenomena video and elicit initial ideas. **Reason -** Have students draw a model of what they saw in the video in their science journals. Point out what makes a good science model - labels, pictures, arrows, etc. Students write down their noticings and wonders about the phenomena. **Communicate -** Class Discussion - Share their noticings and wonders. Chart these to refer to throughout the unit. Use our unit question to drive more noticings and wonderings. How can we observe and explain how we know that matter can not be created or destroyed? **Lesson 2: Imploding Soda Can** **Gather -** Demonstrate how a soda can will implode when heated and placed in cool water. You may have to do this a few times (for small groups of students) so that each student has a chance to watch closely. Video in case you don't have a hot plate - https://www.youtube.com/watch?v=atsgIvOUFhA **Reason -** Students will write what they noticed as they watched the soda can and create an annotated model	**Lesson 1:** • Oil tanker video **Lesson 2:** • Plan • Empty soda can with tab removed • Ice Water • Hot Plate • Mixing Bowl • Tongs

showing what they think caused the can to implode. **Communicate -** Students will share with a partner or in a small group before sharing out as a class. Record their thoughts and ideas on the class chart that can be revisited throughout the unit. Use our unit question to drive more noticings and wondering. How can we observe and explain how we know that matter can not be created or destroyed?	
Episode 2 **Explore** **Days: 8 days**	
Lessons	**Resources**
Lesson 3: Book Lift **Gather -** Class Discussion - Is there a way that you can lift this book off your desk without using your arms or hands? Make predictions **Reason -** Students will complete the experiment - Air Lift Students will draw a model of what they think happened during the book lift experiment. Measure height of book lift in centimeters. Repeat until all members of the group have a chance. Measuring each time. **Communicate -** Students will participate in a quick gallery walk to see classmates' models and then conclude with a class discussion. **Lesson 4: Mystery Substances (3 days)** (NOTE: If you alternate science and social studies, break your class up into groups and have each group test one of the substances and then jigsaw out. If you teach science every day, do one substance each day.) **Gather -** Show students the 5 Mystery Substances labeled A through E in containers. Have students look at each substance and predict what they could be and why using properties of each. Write each description in the A through E boxe on the recording sheet. Recording Sheet **Reason -** Students will then continue the experiment using the recording sheet by adding different materials to each of the Mystery Powders. They will write their observations and if they think it was a chemical or physical change. **Communicate -** Discuss findings. What is a chemical	**Lesson 3:** • Air Lift • Materials: • 1-gallon ziploc bag for each student • 1 straw for each student • Masking tape • Books **Lesson 4:** • Plan • Recording Sheet • Hand lens • 5 Mystery Powders • Baking soda • Cornstarch • Salt • Sugar • baby powder) per group (about 1 TBSP) placed in a paper cup • 3 substances (iodine, water, and vinegar)... 1 or 2 drops of each liquid will be mixed with each powder • Eye droppers • OPTIONAL: Heat source (If you test with a heat source, you will also need foil.)

change? What is a physical change? **Lesson 5: Conservation of Matter Day (2 days)** **Gather -** Ask students - What do you think happens to the mass of a substance when it changes phases between solid and liquid? Explain experiment procedure - Conservation of Matter Lab **Reason -** Students will complete the 3 Stations of the lab. Students should record using the recording sheet in the Conservation of Matter Lab. **Communicate -** Write Around using the following questions: 1. What happens to the mass of a substance when it changes phases between solid to liquid? 2. What happened to each of the substances? 3. Were the substances destroyed? **Lesson 6: Conservation of Mass in a Chemical Reaction Lab (2 days)** (NOTE: If you alternate science and social studies, only do stations 2 and 3. If you teach science every day, you can complete all four stations.) **Gather -** Ask students - What happens to the total mass of substances when a chemical reaction occurs? Demonstrate the Conservation of Mass in a Chemical Reaction Lab as a whole group. **Reason -** As a whole class do all 4 stations. Students will record their starting observations and ending observations from the class experiment. **Communicate -** Science writing- "What conclusions can you make about Conservation of Mass? Use examples and evidence from the lab to support your claim." Create an annotated model. Additional Activity - Watch Burning of Magnesium Video https://www.youtube.com/watch?v=HEU_tblr5Ko	**Lesson 5:** • Plan • Materials: • Scale • Plastic bottle filled with ice • Empty plastic bottle • Empty zipper-seal plastic bag • Chocolate • Glass beaker • Petri dish • Spoon • Hot plate **Lesson 6:** • Conservation of Matter • Balance or scale • Scrap Paper • Baking Soda • Vinegar • Graduated cylinder • Balloon • Rubber band • Ceramic dish • Magnesium Ribbon (video) • Digital scales • Wand style lighter • 2 beakers • Test tube with Copper (II) Nitrate solution • Test tube with Sodium Hydroxide solution
Episode 3 **Explain** **Days: 7 days**	
Lessons	**Resources**

Lesson 7:- Vocabulary Splash **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class.	**Lesson 7:** ● **Vocabulary Words** - compress, conduction, detect, dissolve, mineral, relative, solubility, substance, atom, accuracy, alternative, conserve, Kelvin, react, substance ● Sentence strips or digital copy
Lesson 8: Epic Book - Changing Matter **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** We are going to learn more about chemical and physical changes. Teacher or students read the Digital Read Aloud of Changing Matter **Reason -** Complete the quiz that goes along with the Epic book. Link - Use packet to show knowledge Chemical and Physical Changes **Communicate -** Check for understanding. Have students fill in this worksheet. Write words on the board that they should use. .fill-in.pdf	**Lesson 8:** ● Epic Book Changing Matter - Link ● Chemical and Physical Changes ● fill-in.pdf
Lesson 9: Modeling the States of Matter(2 days) (NOTE: If you teach science every day, you can supplement this topic with the additional activities that BrainPOP provides.) **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** If we had a microscope what would a solid look like? A liquid? A gas? We will watch the States of Matter video on BrainPOP to learn more about these states of matter. **Reason -** Students watch the video and use the printable template from this Brainpop lesson for students to take notes.	**Lesson 9:** ● Video - BrainPop States of Matter ● Matter Sorter Game ● StatesofMatterProjectRubric

Communicate - Students create a Canva Infographic (www.canva.com) or annotated model for each state of matter mentioned in the video. Gallery Walk to share. Teacher uses rubric to assess - StatesofMatterProjectRubric *******If time students play Matter Sorter Game **Lesson 10: Properties of Matter Video** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Ask students - how can we identify an object? By its properties. Students watch the "What's My Property" video as a Video Aloud. **Reason** - Students will create a vocabulary foldable in their notebooks highlighting important vocabulary words from the video and unit. All students must include the definitions for physical property and chemical property, but can then choose 3-4 additional vocabulary words from the unit vocabulary list above. **Communicate -** Students will share out the vocabulary words they chose to include in their foldable. List out thee words on chart paper. Then play a game - What's My Word? Students give 3 hints to the word and students guess the word. **Lesson 11: Newsela Article Independent Research** (2 days) **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Why is it important to understand matter in our world? Today you will choose an article to read about that connects with the states of matter. Using Newsela, search for an interesting article that you would like to read and share with the class. Students can search in Newsela with the word matter to find articles. ****All articles need to be approved first by the teacher. **Reason -** Find the main idea and supporting details of the article you chose. Students use the template to organize their new information. MainIdeaandSupportingdetailsTemplate	**Lesson 10:** • Video - What's My Property" • Template for foldables • Vocabulary words above **Lesson 11:** NEWSELA Article - The Conservation of Matter During Physical and Chemical Changes

Communicate - As a class, share main ideas for each section and use them to identify the central idea of the article. Additional Newsela Article if needed: Properties of Matter Phase Changes Between States of Matter Changes in Matter:physical versus chemical changes	
Episode 4 **Elaborate/Build New Content/Apply new Content** **Days: 3 days**	
Activity	**Resources**
Conduct an investigation to determine whether the mixing of two or more substances results in new substances. ● Students choose two substances that they think will cause a physical change. *******Approval by teacher first. ● Use the template below to plan and carry out investigation.5-PS1-4+Mixing+Substances ● Complete the CER CER TEMPLATE SCIENCE!	Substances approved by teacher and brought from home
Episode 5 **Evaluate** **Days: 2 days**	
Assessment	**Resources**
States of Matter Assessment Use study guide first and then assessment	● Study Guide ● Assessment
Common Core State Standards Connections:	
ELA/Literacy – ● 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 –** ● 5.NBT.A.1 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)	

- 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)
- 5.MD.A.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)
- 5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)
- 5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

Instructional Strategies: Supports English Language Learners

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia)	Charts	In pairs or partners
Manipulatives	Graphic organizers	In triads or small groups
Pictures & photographs	Tables	In a whole group
Illustrations, diagrams, & drawings	Graphs	Using cooperative group
Magazines & newspapers	Timelines	structures
Physical activities	Number lines	With the Internet (websites) or software programs
Videos & films		In the home language
Broadcasts		With mentors
Models & figures		

Differentiated Strategies

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
Repeat/confirm directions	Increase task structure (e.g., directions, checks for understanding, feedback)	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering questions in class)	Individualized assessment tools based on student need
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 2 - Energy, Organisms and the Ecosystems	**Grade 5**	**Days**

Standards:
Students who demonstrate understanding can:
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-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.]

Anchoring Question:

- How and where do organisms derive their energy?
- How can we explain the role that the sun plays in helping ecosystems survive and flourish?

Essential Questions:

1. How is the sun important to our lives?
2. How is the sun important to all organisms on earth?
3. In what ways is the sun related to the flow of energy?
4. How is the sun important to all organisms on earth?
5. How does the sun impact the roles of producers, consumers and decomposers in an ecosystem?
6. How can an organism maintain its population in an ecosystem? What factors can threaten a species?

Enduring Understandings:

- Everything gets its energy from the sun.
- Plants, animals, and humans rely on each other for energy.
- An ecosystem is a community of independent organisms along with the inorganic components (chiefly soil, water, air, and rocks) that make up their environment.
- A biome is a large ecosystem, characterized by its dominant life-forms—for example, the Amazonian rainforest.
- The organisms in a biological community are linked in their need to obtain energy from food, which derives from the Sun through plant life. (There are, however, some communities, in areas such as deep-ocean rifts, that are not dependent on sunlight at all.)
- The organisms in the food web can be viewed in three groups: producers (plants), consumers (primary-and secondary-consuming animals, whether herbivores, carnivores, or omnivores), and decomposers (that is, both detritivores and true decomposers).
- Food webs/ chains are made up of primary, secondary, and tertiary consumers.

Storyline Narrative / Big Ideas: This unit will focus on ways that organisms find and make energy. Students will learn about the balance between plants and animals within an ecosystem. Finally, students will create chains and webs that show how the sun impacts entire ecosystems.

This unit places an emphasis on the idea that organisms are related in food webs in which some animals eat plants for food, and other animals eat the animals that eat the plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore act as “decomposers”. Decomposition eventually restores some materials back to the soil. Organisms can only survive in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of organisms are able to meet their needs in a relatively stable web of life and all organisms meet these needs through the transfer of the sun’s energy through matter.

Vocabulary Words: convert, indicator, energy flow, flow chart, potential Energy, kinetic Energy, Solar Energy, photosynthesis, cellular respiration, reproduce, conserve, cycle, decompose, transfer

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. -Use models to describe phenomena. (5-PS3-1)	**PS3.D: Energy in Chemical Processes and Everyday Life:** The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) **LS1.C: Organization for Matter and Energy Flow in Organisms:** Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) **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	**Energy and Matter** - Energy can be transferred in various ways and between objects. (5-PS3-1) **Systems and System Models** - A system can be described in terms of its components and their interactions. (5-LS2- 1)

	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)	
Consolidated Supply List: ● 5-6 Plants		

- Plastic Bags
- Paper Bags
- Petroleum Jelly
- Bromothymol Blue
- Safety Goggles
- Straws
- 5-6 Elodea Plants
- 5-6 Funnels
- 5-6 Trays
- Brainpop subscription

Episode 1
Engage/Elicit Ideas
Days: 1 day

Lessons	**Resources**
Lesson 1: Phenomenon **Gather -** Show phenomena slide show **starting at 40 secs** and elicit initial ideas. Ask students why they think sunflowers move with the sun. **Reason -** Students write down their noticings and wonderings about the phenomena. **Communicate -** Class Discussion - Share their noticings and wonderings about the time lapse. Have students draw a model explaining their thinking in their science journals. Point out what makes a good science model - labels, pictures, words, arrows, etc.	**Lesson 1;** Phenomenon - start at 40 secs.

Episode 2
Explore
Days: 5 days

Lessons	**Resources**
Lesson 2: Plant Lab Set up a Plant Lab. **Gather -** Ask students: • How do plants gather and convert energy into food? • Where do plants gather their resources for growth? **Reason -** Plant Lab (see instructions) - You will be creating an experiment to test the factors that help plants grow. The change you select is called the variable. The teacher will keep a control plant that is in a window and	**Lesson 2:** • Plant Lab • One control plant • One plant for each group • Plastic bags • Paper bags • Petroleum Jelly

receives 1,000 mL of water each day and has access to the air in the room. You will be keeping a daily record of measurements and observations. **Communicate -** Share hypotheses/experiments with the class. Record each group's hypothesis on a class chart so that you can check in on the status of each group's hypotheses throughout the two week period. **Lesson 3: Photosynthesis and Cellular Respiration Lab Part 1** **Gather -** Ask students - What is photosynthesis? What is cellular respiration?How do plants gather and convert energy into food? Tell students you will be conducting experiments to discover if there is a relationship between photosynthesis and cellular respiration.(use the lesson link to carry out investigations) **Reason -** Students will record observations from Part 1 of the lab. Then have students hypothesize what will happen when the test tubes are placed in the sun. **Communicate -** Have each group share out their hypothesis with the class. **Lesson 4: Photosynthesis and Cellular Respiration Lab Part 2** **Gather -** Review day 1 of the Photosynthesis and Cellular Respiration Lab. Students can take a gallery walk to observe classmates' results. **Reason -** Students will do part 2 of the lab on cellular respirations. (see lesson under episode supply list) Students will record observations. **Communicate -** As a class, discuss what would happen if you were to put a snail into the water. **Lesson 5: Decomposition Lab Day 1** **Gather -** Watch the video: "Where do Fallen Leaves Go?" up until it begins detailing the Activity part. **Reason -** Students will complete the first page of the	**Lessons 3 and 4:** • Photosynthesis & Cellular Respiration Lab • Eye dropper • Bromothymol Blue (BTB) • 2 Test Tubes with cap (per group) • Safety Goggles • 2 250mL Beakers or Clear Cups (per group) • Water • Plastic Straws • Elodea or Similar Plant for each group • 1 Funnel (per group) • 1 Tray (per group) **Lesson 5 and 6:** • Decomposition Lab • Gallon Sized Ziplock Bag (for each group) • Thick paper plates to fit into each

Mold Terrarium Worksheet in groups or pairs. **Communicate** - Students will share out their ideas and plans. **Lesson 6: Decomposition Lab Day 2** **Gather -** Allow students to briefly review their plans from the previous day with their groups or partners. **Reason -** Students will be setting up their mold terrariums. **Communicate -** Display each groups growth and observations chart, found on page 2 of the Mold Terrarium worksheet so that students can see and compare their results and observations over the next two weeks.	Ziplock Bag • 9 oz. Solo Cup (for each group) • 1 slice of apple, orange and banana or strawberries (for each group)\Duck Tape • 1 slice of day old bread (for each group) • Additives to inhibit mold growth (salt, sugar, and/or hot pepper)
Episode 3 **Explain** **Days: 3 days**	
Lessons	**Resources**
Lesson 7:- Vocabulary Splash **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** Partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class. **Lesson 8: Types of Energy** (NOTE: If you alternate science and social studies, break your class up into groups and have each group read and take notes on one of the types of energy and then jigsaw out. If you teach science every day, do one type of energy each day.) **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Today you will research a type of energy and take notes. You will look at either potential, heat, kinetic or solar energy. **Reason -** Students in groups will take notes on their assigned type of energy. See links in the episode supply	**Lesson 7:** • Vocab Words **Lesson 8:** • Potential Energy • Heat Energy • Kinetic Energy • Solar Energy

list section for articles or websites on each type of energy that the students can choose from. Students create a teaching chart that will be used to help your peers learn about your type of energy. Chart should include - words, pictures, examples, definitions, and symbols. **Communicate -** Teach your peers using the chart you created. (Can also be done using Flipgrid.) **Lesson 9: Photosynthesis** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Watch The Magic School Bus Video: Gets Planted (Photosynthesis). **Reason -** In science notebooks, students and teacher draw a diagram of photosynthesis together. Teacher resource to help teach from - Photosynthesis - Basic Process or Photosynthesis **Communicate -** Students will share out their diagrams to explain/define photosynthesis. **Lesson 10: Cellular Respiration** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Watch the Cellular Respiration video on BrainPOP independently. **Reason -** Create a diagram of what happens during cellular respiration in their science notebooks. **Communicate** - Gallery Walk **Lesson 11: Energy Flow** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather** - Read NEWSELA article: The Cycle of Photosynthesis and the PBS Video on Cellular Respiration. **Reason -** Create an annotated model of how	**Lesson 9:** • The Magic School Bus Video: Gets Planted (Photosynthesis) **Lesson 10:** • Cellular Respiration BrainPop **Lesson 11:** • The Cycle of Photosynthesis and Cellular Respiration • PBS Video: Cellular Respiration

photosynthesis and cellular respiration are connected. **Communicate:** Students will participate in a gallery walk to see their classmates annotated models. Additional Resources: Epic Books on Photosynthesis Crash Course YouTube on Photosynthesis Additional BrainPop Activities for both Photosynthesis and Cellular Respiration Ducksters Article and Quiz: Energy Ducksters Articles for each type of energy also has a quiz	
Lesson 12: Plant Lab Follow Up **Gather** - Today we are going to study and reflect on the effect of withholding certain conditions on our plants. **Reason** - Students will meet in their groups and make observations about their plants. They will then have the opportunity to reflect on those observations and either confirm or revise their hypothesis. **Communicate** - Students will share out results while teacher records in a class chart.	**Lesson 12:** • Plant Lab
Lesson 13: Parts of a Food Web **Gather -** Students will watch the video "Food Chain Mystery." **Reason** - Students will be separated into jigsaw groups where they will have to identity the definition and picture of a decomposer, producer, or consumer. **Communicate** - Students will then return to their home groups and share out their part of the food web.	**Lesson 13:** • Food Chain Mystery
Lesson 14: Building A Food Web **Gather -** Watch the BrainPop video on Food Webs. **Reason** - The class will construct a human food chain/web to see how energy flows. **Communicate** - Students will create an annotated model based on the food chain/web they created.	**Lesson 14:** • BrainPop Food Webs • Food Chains and Food Webs
Lesson 15: Maintaining An Ecosystem **Gather -** Have students reconstruct the food web. Use the Food Chains and Food Webs lesson.	**Lesson 9:** • Food Chains and Food Webs

<u>Reason</u> - Students will complete step 4 of the lesson to see the effect of what can happen if even one small organism dies in an ecosystem. **<u>Communicate</u>** - Students can complete the graphic organizer with a partner.	
Episode 4 **Elaborate/Build New Content/Apply new Content** **Days: 3 days**	
Activity	**Resources**
1. Photosynthesis + Cellular Respiration: Students will create a teaching tool (FlipGrid, poster, Google Slides) that shows the connection between photosynthesis and cellular respiration. Or 2. Food Web/Food Chain: Students can either create a food chain on a sentence strip or a food web on a piece of paper with yarn.	• Markers • Paper • Sentence Strips • Access to technology • Poster board • Construction Paper
Episode 5 **Evaluate** **Days: 2 days**	
Assessment	**Resources**
Unit 2 Study Guide and Assessment (see shared folder)	
Common Core Curriculum Connections:	
ELA/Literacy – • 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-PS3- 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- PS3-1) • 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-LS2- 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- LS2-1)	
Instructional Strategies: Supports for English Language Learners	

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia) Manipulatives Pictures & photographs Illustrations, diagrams, & drawings Magazines & newspapers Physical activities Videos & films Broadcasts Models & figures	Charts Graphic organizers Tables Graphs Timelines Number lines	In pairs or partners In triads or small groups In a whole group Using cooperative group structures With the Internet (websites) or software programs In the home language With mentors

Differentiated Strategies

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
Repeat/confirm directions	Increase task structure (e.g., directions, checks for understanding, feedback)	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering questions in class)	Individualized assessment tools based on student need
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 3 - Earth's Systems and the Universe (Human Activity)	Grade 5	Days - 20

Standards:
Students who demonstrate understanding can:
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 saltwater 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-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from 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. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Anchoring Question:

- How are the systems of the Earth connected?

Essential Questions:

1. What are the four major systems of the Earth?
2. How do Earth's systems interact to affect Earth's surface materials and processes?
3. How can the actions of humankind impact and affect the Earth's systems?

Enduring Understandings:

- Explain the four major systems of the Earth.
- Differentiate between the different layers of the Earth based on distinct characteristics.
- Describe how life on Earth would be different if the ozone layer continues to be depleted.
- Interpret and create graphs that represent the location of both salt and fresh water on Earth.
- Analyze lab results that suggest that areas near water will see milder temperature fluctuations

than areas that are further inland.

Storyline Narrative / Big Ideas: This unit will focus on how the earth is a nonliving object that is made up of four major systems. The Earth's geosphere is everything that makes up the nonliving surface of the earth and its layers. The hydrosphere consists of all the water on the earth. This includes water in oceans, lakes, streams, ponds, groundwater, glaciers and other ice forms. It can be made up of liquid or frozen water and freshwater or saltwater. The atmosphere consists of the layer of gas (air), which is made up of mostly nitrogen and oxygen, that surrounds the Earth. This gives plants and animals the air it needs to breathe and survive. The biosphere is the Earth's outer shell that is made up of land, air, and water where all living things exist. Each system is dependent on one another.

Vocabulary Words: axis, orbit, gravitational pull, phase, atmosphere, erosion, destructive, mineral, geosphere, hydrosphere, light years, magnitude

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Support an argument with evidence, data, or a model. (5-ESS1-1) **Developing and Using**	**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) **ESS2.A: Earth**	**Patterns -** Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2) **Scale, Proportion, and Quantity -** Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2) **Systems and System Models -** A system can be described in terms of its components and their interactions. (5-ESS2-1)

Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model using an example to describe a scientific principle. (5-ESS2-1) **Using Mathematics and Computational Thinking** Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 3– 5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)	**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)	

Consolidated Supply List:

- Baking sheet
- Black construction paper
- Dixie cups 30
- Measuring cups
- 4 large paper bags
- Paper plates
- Plastic spoons
- Salt
- Ziplock bags (sandwich)
- One small and one large flashlight
- Large construction paper 11x17
- Mystery Science subscription
- Brainpop subscription
- Kahoot subscription

Episode 1
Engage/Elicit Ideas
Days: 2 days

Lessons	Resources
Lesson 1: Phenomenon - Earth's Systems **Gather** - Show the phenomenon video (stop at 2.11) of a volcano exploding and elicit initial ideas. Ask students: Can any one event affect the systems of the Earth? **Reason** - Students write down their noticings and wonderings about the phenomena. **Communicate** - Class Discussion - Share their noticings and wonderings about what happened after the volcano erupted. Have students draw a model explaining their thinking in their science journals. Point out what makes a good science model - labels, pictures, arrows, etc. Suggested rules for drawing science models - RULES FOR SCIENTIFIC DRAWINGS and DIAGRAMS: **Lesson 2: Phenomenon - Earth and the Universe** **Gather** - Show the National Graphic video: *Time Lapse of*	**Lesson 1:** • Phenomenon Video: Volcano Exploding • Noticings and wonderings - Notice Wonder Catcher.pdf **Lesson 2:** • National Geographic Video • Noticings and wonderings -

America's Great Spaces. Ask students: How do you know that objects in the universe can change positions? **Reason -** Students write down their noticings and wonderings about the phenomena. **Communicate -** Class Discussion - Share their noticings and wonderings about what happened throughout the time lapse. Have students draw a model explaining their thinking in their science journals. Point out what makes a good science model - labels, pictures, arrows, etc. Suggested rules for drawing science models - RULES FOR SCIENTIFIC DRAWINGS and DIAGRAMS:	Notice Wonder Catcher.pdf
Episode 2 **Explore** **Days: 5 days**	
Lessons	**Resources**
Lesson 3: Connect the Spheres: Earth Systems **Gather -** Students will be going on a nature walk around their building. While students are on the nature walk, they should be recording observations of what they see, what's going on outside, what is happening in nature, and if they are noticing any changes in nature around them. **Reason -** Gather students back together in the classroom, or outdoor classroom. Show them the diagram of the components of Earth systems from the PowerPoint: Water, Soil, Air, Living Things, Sun (Slide 3). Ask students to write which system category each observation falls into (water, solid, air or living things). They can write this in the left column next to each observation on the capture sheet. Share the science terms for water, soil, air and living things. (hydrosphere, geosphere, biosphere, atmosphere) **Communicate -** Have a class discussion regarding the following question.How do these systems interact? For example living things with water. Students choose two components and do a quick write about how they interact. **Lesson 4: Dust Bowl** Mystery Lesson - link **Gather** - Students will look at the pictures of the 1930s Dust Bowl incident on the Great Plains. **Reason** - Students will generate observations and	**Lesson 3:** • Lesson - Connect the Spheres Lesson • Powerpoint - Connect the Spheres PP (1).ppt • Capture Sheet - Connect the Spheres SCS.pdf **Lesson 4:** • Lesson - link • See Think Wonder - link • Causes of the Dust Bowl - link

questions about the phenomenon and create an initial model to explain how Earth's four spheres interacted to cause the Dust Bowl. Teacher saves these model for the end of the unit scenario. **Communicate** - Students draw their own science model of Earth's Systems using the labels - (hydrosphere, geosphere, biosphere, atmosphere) **Lesson 5: How Much Water is in the Ocean?** Mystery lesson - link **Gather** - Ask students - what is in the ocean? Write down all the things they say. Then ask what are some things in the sea we can't see. **Reason** - Tell them they are going to find a way to see how much water is in the ocean by creating a tiny ocean. Students create a model ocean to observe how salt seems to completely vanish when dissolved in water. Students then measure and graph quantities of the water and salt to provide evidence that, even though we can't see it, the salt still weighs the same amount. Students also create a model salt flat, allowing the water to evaporate, leaving the salt behind. **Communicate** - Students complete the Tiny Ocean lab questions to reflect on the experiment. **Lesson 6: What Affects the Brightness of Stars** **Gather** - Ask student what they think affects the brightness of the stars? Display the star website (The Brightest Stars in the Sky: A Starry Countdown | Space) as you discuss each star students record the magnitude and distance in light years of each star on the record sheet - The Truth About the Brightness of Stars Chart.docx **Reason** - Have students examine the data on their record chart with a partner. Look for patterns and reflect on what makes the one star brighter than all the rest. **Communicate** - Students share their data findings. Have students use the exit ticket to explain what makes one star brighter than another?	**Lesson 5:** • Lesson - link • Baking sheet • Black construction paper • Dixie cups 30 • Measuring cups • 4 large paper bags • Paper plates • Plastic spoons • Salt • Ziplock bags (sandwich) • Worksheet - link **Lesson 6:** • Lesson - Better Lesson - What Affects the Brightness of Stars • One small and one large flashlight • Star website - The Brightest Stars in the Sky: A Starry Countdown | Space • Exit ticket - brightness of stars exit ticket • Record chart - The Truth About the Brightness of Stars Chart.docx
Episode 3 **Explain**	

Days: 9 days	
Lessons	**Resources**
Lesson 7: Vocabulary Activity **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** Partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class. **Lesson 8: The Earth's Systems Research** (3 days) **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather** - Discuss how students will do some research to create a model of the Earth's Systems. You will work with a group of students to create this model. You will be given research materials to do this research and note taking options. **Reason** - Have students work in teams to watch or read all of the below. They take notes on any of the suggested note taking methods.NoteTakingGraphicOrganizers-1.pdf Research materials - ● Video - Crash Course Video Geosphere and Biosphere ● Video - Crash Course Video Hydrosphere and Atmosphere ● Article - Earth's System Article ● Epic book - The Four Spheres of Earth by Paul Larson - https://www.getepic.com/app/read/42487 **Communicate** - Give students a large piece of construction paper and past the Earth's system template i the middle.Earth Systems Template.pdf Label each system/sphere on the Earth's Systems Template. Examples of hydrosphere should be labeled in blue, geosphere in brown, atmosphere in red, and biosphere in green. As a class, have students add their notes/information they learned from the research materials to their diagram. Teachers here is an example - Student Poster Example 3.jpg	**Lesson 7:** Vocabulary words - axis, orbit, gravitational pull, phase, atmosphere, erosion, destructive, mineral, geosphere, hydrosphere, light years, magnitude **Lesson 8:** ● Lesson Information - https://teaching.betterlesson.com/lesson/634345/the-earth-s-systems ● Crash Course Video Geosphere and Biosphere ● Crash Course Video Hydrosphere and Atmosphere ● Earth's System Article ● Epic book - https://www.getepic.com/app/read/42487 ● Earth System Template - Earth Systems Template.pdf ● Large construction paper 11x17

Lesson 9: Moon Phases **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather** - Students watch Brainpop.com video on the Moon Phases and take notes using the graphic organizer provided on the lesson website. **Reason** - Use the worksheet provided on the lesson website and the moon calendar website Moon Phase to answer the questions presented on the worksheet, **Communicate** - Play Moon Phases Kahoot link Or link **Lesson 10: The Earth, Moon and Sun Jigsaw** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Display the article on the smartboard to the class. Article - The Sun and the Earth-Moon System | Earth Science **Reason -** Jigsaw: Break students into four groups. One group will focus on the day/night cycle, another group will focus on the Earth's seasons, another group will focus on the phases of the moon and the last group will focus on the tides. In groups, students will create a teaching poster or slide on either google slides or Jamboard. **Communicate -** Each group will teach the class about their section of the article. **Lesson 11: Great Pacific Garbage Patch** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather** - Show students Great Pacific Garbage Patch slideshow at the top of this article. Review the rest of the article and share with students. **Reason** - In partnerships, have students create a t-chart listing how humans effect Earth's Systems in a positive and negative way.T-Chart	**Lesson 9:** ● Video - https://www.brainpop.com/ ● Kahoot games - link or link ● Moon website - Moon Phase **Lesson 10:** ● The Sun and the Earth-Moon System | Earth Science **Lesson 11:** ● Great Pacific Garbage Patch Article ● T-chart - T-Chart ● Essay - OpinionWritingGraphicOrganizer ArgumentativeWriting

Communicate - Students write a piece of writing informing people about the effects of dumping garbage in the water. Use one quote in their piece. OpinionWritingGraphicOrganizerArgumentativeWriting	
Episode 4 **Elaborate/Build New Content/Apply new Content** **Days: 3 days**	
Activity	**Resources**
How Can You Protect Your Farm from the Next Dust Bowl? Project - Link **Gather** - Gather students and view the unit review to set up the scenario. **Reason** - Students inherit a farm in the Midwest. They use their Dust Bowl model to evaluate four Drought Protection kits and select which one they think is the best choice. Students write an argument to defend their kit selection, using evidence from the unit. **Communicate** - Build a model of all the farms with all solutions to protect the farms from the next dust bowl.	• Project lesson - Link • Worksheet - My Kansas Farm • Worksheet - Kit Argument • Worksheet - Kits • Materials to build models (students can bring things in from home based on their plan)
Episode 5 **Evaluate** **Days: 1 day**	
Assessment	**Resources**
Museum viewing of models	Teacher uses rubric to assess - mystery-science (12).pdf
Common Core Curriculum 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-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-ESS1-1) W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (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) 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) 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 –
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)

Instructional Strategies: Support for English Language Learners

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia)	Charts	In pairs or partners
Manipulatives	Graphic organizers	In triads or small groups
Pictures & photographs	Tables	In a whole group
Illustrations, diagrams, & drawings	Graphs	Using cooperative group
Magazines & newspapers	Timelines	structures
Physical activities	Number lines	With the Internet (websites) or software programs
Videos & films		In the home language
Broadcasts		With mentors
Models & figures		

Differentiation Strategies

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
Repeat/confirm directions	Increase task structure (e.g., directions, checks for understanding, feedback)	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering questions in class)	Individualized assessment tools based on student need
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 4: Gravitational Pull	Grade 5	Days - 12

Standards:
Students who demonstrate understanding can:
5-PS2-1. 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.]

Anchoring Question:

- How would life be different on Earth with no gravitational force on objects?

Essential Questions:

1. How does weight and mass affect the gravitational force on various objects?
2. Why is it important to understand gravity?
3. How would life be different on Earth with no gravitational force on objects?

Enduring Understandings:

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

Storyline Narrative / Big Ideas: This unit will focus on the gravitational force exerted by Earth on objects. This force is directed down. The students will use simulations to see the effects on the planet when a gravitational force is not present. Students will also learn about astronauts in space living in a space with no gravity. How does that affect their lives in space?

Vocabulary Words: gravity, mass, gravitational pull, weight, pounds, defy, force, Galileo

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
<u>Engaging in Argument from Evidence</u> Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Support an argument with evidence, data, or a model. (5-PS2-1)	**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)	**Cause and Effect** - Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

Consolidated Supply List:

- Yard Stick
- Chart Paper
- Styrofoam ball
- Tennis ball
- 5 napkins
- 6 straws
- string (about 1 yd.)
- 1 plastic cup
- 5 paper clips
- 6 index cards
- 2 coffee filters
- washers
- Weight scale
- Mass scale
- Brainpop subscription
- Book - Moonshot: The Flight of Apollo 11 By B. Floca,

Episode 1
Engage/Elicit Ideas
Days: 1 day

Lessons	Resources
Lesson 1: Phenomenon - Tears in Space **Gather -** Show the phenomena video Tears in Space. Ask students: How would life be different on Earth with no gravitational force on objects? **Reason -** Students write down their noticings and wonderings about the phenomena. Notice Wonder Catcher.pdf **Communicate** - Class Discussion - Share their noticings and wonderings about what happened in the video. Have students draw a model explaining their thinking in their science journals. Point out what makes a good science model - labels, pictures, arrows, etc.	**Lesson 1:** • Phenomenon: Tears in Space • Notice Wonder Catcher.pdf

Episode 2
Explore
Days: 3 days

Lessons	Resources
Lesson 2: Astronaut Olympics Lesson - link **Gather** - Show the 40 second Astronaut Olympics Video. Discuss how high these astronauts jumped on the moon.	**Lesson 2:** • Astronaut Olympic Video • Lesson - link • Yard Stick • Marker

Could we jump 3 - 4 feet. Let's figure out how high that is using a yardstick. Then -Ask students how high they can jump hear on earth **Reason** - In groups, students will record how high each member of the group can jump. Determine the student with the highest jump in the class. Discuss the differences between an astronaut on the moon and the student with the highest jump in the classroom. As a class, discuss the question: Why can an astronaut jump higher on the moon than on Earth? **Communicate** - Hand the student a 20 lb backpack and explain that an astronaut's suit weighs 180 lbs. Ask students to turn and talk about the number of 20 lb backpacks that are equal to an astronaut's suit. After discussing, students determine it will take 9 backpacks to equal the weight of a space suit. As a class, complete the Mass and Weight chart.	• Chart Paper • Class Mass and Weight Chart • Sample Teacher Mass and Weight Chart
Lesson 3: Gravity and Orbits Simulation **Gather -** Teacher will present the Gravity and Orbits Simulation - Gravity and Orbits Simulation Teacher selects Earth and Moon with gravity force on and gravity on. After a few seconds turn off gravity and allow students to make their observations. (A free login must be created in order to use the simulator). **Reason** - Students draw a picture of cause - force turned off and th effect on the Sun, Moob abd Stars. 5-PS2-1+Effect+of+Gravity+(Student+Version).pdf **Communicate -** Put students into partnerships and have students defend their ideas to their partner.	**Lesson 3:** • Gravity and Orbits Simulation
Lesson 4: Gravity Investigation **Gather** - Pass around a tennis and styrofoam ball and allow each student to feel the weight of each. Have each student form a hypothesis about which ball they think will hit the floor first if dropped at the same time from the same height. **Reason -** Conduct the experiment linked in the supply list. Have students record the type of ball on one side, the weight on the other. Then drop them both and see which hits the floor first. Do it 3 times - Gravity Data Table .	**Lesson 4**: • Gravity Investigation • Styrofoam balls • Tennis balls • Yardstick • Weight scale • Mass scale • Gravity Data Table

Communicate - Have students meet in groups to evaluate the data and determine whether their hypothesis was accurate or needs to be revised and why. In the lesson linked to the right, there are thought prompts who need modifications.	
Episode 3 **Explain** **Days: 5 days**	
Lessons	**Resources**
Lesson 5:- Vocabulary Splash **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class. **Lesson 6: BrainPOP Gravity** (NOTE: If you teach science every day, you can supplement this topic with the additional activities that BrainPOP provides.) **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Watch the Gravity video on BrainPOP independently. **Reason -** Assign the graphic organizer associated with the video. Have students complete this graphic organizer while watching the video. **Communicate** - Share their findings. Quick write - tell me everything you learned about gravity. In their journals students will write as much as they can in 1 minute. Share what they wrote with a partner. **Lesson 7: Gravity Research** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather -** Read Aloud- Moonshot: The Flight of Apollo 11.	**Lesson 5:** • Vocabulary - gravity, mass, gravitational pull, weight, pounds, defy, force, Galileo **Lesson 6:** • BrainPOP Video: Gravity • Graphic Organizer • Worksheet in lesson **Lesson 7:** Texts to be used for research: • Gravity Video • Weight or

By B. Floca, Tell students that they will research mass, weight, and gravity through a jigsaw activity. **Reason -** Each home group should have 4 students as there are four texts. Students will leave their home group to meet with students from other groups (expert groups) researching the same text. They should take notes and be prepared to teach what they learned from their text. Students will come together to teach their home group what they learned with their expert groups. **Communicate -** Have a class discussion about what we learned about weight, mass, and gravity. Based on this discussion, create a class definition of weight and mass. **Lesson 8: Epic Books: Gravity Defying Animals (2 days)** **Gather -** Play the Gravity Song video for students to understand more about the importance of gravity. The Gravity SONG , Discuss that there are some animals that can defy gravity. What does defy mean? Assign Gravity Defying Animals on Epic Books. Have students independently read the book. **Reason -** Students read this assigned book. Take notes on each gravity defying animal. Gravity Defying Note Taking Then have students write 3 questions down at the bottom of the note taking sheet above that will be used for a class quiz game. Collect questions and create a (Kahoot) with their questions. **Communicate -** Next day or same day play student created game on Kahoot	Mass? • Apparent Weight • Mass and Weight Introduction Materials: • Chart Paper • Markers • Book - Moonshot: The Flight of Apollo 11. By B. Floca, **Lesson 8:** • Gravity Defying Animals • Gravity Defying Note Taking • The Gravity SONG
Episode 4 **Elaborate/Build New Content/Apply new Content** **Days: 2 days**	
Activity	**Resources**
Lesson 9: Parachute Challenge **Gather -** Break class up into groups and introduce the challenge. Give students a chance to begin researching parachutes.	**Lesson 9:** Parachute Project Links: • Step1: Introduction • Step 2: Engineering Parachutes

<table>
<tr><td><u>Reason</u> - Students will be designing a parachute using only the materials listed in the supply list. Their parachute must meet the following criteria:

● Needs to land safely on the Target
● Needs to drop from 2 meters (Later, we'll change this to 1.5 m or 150 cm as students weren't tall enough!)
● Drop as slow as possible (I purposefully didn't place any time limits on this as I want students to keep pushing themselves to find more and more ways to slow the parachute.)
● The parachute has to stay together. (The students came up with this one.)

<u>Communicate</u>: Each group of students will get to test their prototype in front of the class. After each group has tested, have a class discussion around the following questions:

Then students write an opinion piece on what you think could improve our designs for next time? What would we do differently? Provide reasoning and examples.</td><td>● Step 3: Parachute Failure Points and Improvements

Materials:

● 5 napkins
● 6 straws
● 2 pieces of paper (11"x8.5")
● string (about 1 yd.)
● 1 plastic cup
● 5 paper clips
● 6 index cards
● plastic shopping bag
● 2 coffee filters
● masking tape (about 1 ft. placed on top of box)
● a Target
● a washer</td></tr>
<tr><td colspan="2">Episode 5
Evaluate
Days: 1 day</td></tr>
<tr><td>Assessment</td><td>Resources</td></tr>
<tr><td>Quizz - (get free account) Gravity for Grade 5 | Science - Quizizz</td><td></td></tr>
<tr><td colspan="2">Common Core Curriculum Connections:</td></tr>
<tr><td colspan="2">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)
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)
W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1)</td></tr>
<tr><td colspan="2">Instructional Strategies: Supports for English Language Learners</td></tr>
</table>

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia) Manipulatives Pictures & photographs Illustrations, diagrams, & drawings Magazines & newspapers Physical activities Videos & films Broadcasts Models & figures	Charts Graphic organizers Tables Graphs Timelines Number lines	In pairs or partners In triads or small groups In a whole group Using cooperative group structures With the Internet (websites) or software programs In the home language With mentors

Differentiation Strategies

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
Repeat/confirm directions	Increase task structure (e.g., directions, checks for understanding, feedback)	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering questions in class)	Individualized assessment tools based on student need
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading