3rd, 4th and 5th GRADE SCIENCE CURRICULUM

Middle Township Public Schools
216 S. Main Street
Cape May Court House, NJ 08210

Born On Date: April 19 2018

SUBJECT: Science
GRADE LEVEL: 3
UNIT TITLE: Earth Science
LESSONS: 15

Unit Learning Goals
● Students will be able to predict weather conditions based on information collected. ● Students will be able to analyze and interpret data to understand what climate is in different parts of the world. ● Students will be able to ask questions about what caused changes in weather patterns. ● Students will be able to collect data using tools. ● Students will be able to describe different natural hazards ● Students will be able to analyze methods for reducing damages caused by natural hazards.

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	Disciplinary Core Ideas	Modifications	Assessment/ Benchmarks
What is weather, how it changes over time, and weather tools *Great resource links http://www.ducksters.com/science/weather.php http://www.weatherwizkids.com/weather-experiments.htm	-Exploring Science 118 - 121 Brain Pop Jr: Temperature PSI weather/climate slide 10 - 11 -Build your own thermometer activity	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so	Visuals Closed captions Describe weather leveled support p119	Output: Results of Activity and discussion

		predictions about what kind of weather might happen next. (3-ESS2-1)	that they can make predictions about what kind of weather might happen next. (3-ESS2-1)		
Measuring weather *remember to observe/record data 10 min for 1 week	-Exploring Science 122 - 123 Making an anemometer	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	Visuals Elaborate	Output: Results of Activity and discussion
Make weather predictions	-Exploring Science 124 - 125 Brain Pop: Weather Video and quiz for discussion PSI weather/climate slide 89 - 90	ESS2.D: Weather and Climate: Scientists record patterns	ESS2.D: Weather and Climate: Scientists	Visuals Elaborate Closed captions	My Science Notebook pg125

		of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)		#2
Order and patterns of Seasons	-Exploring Science 126 -127 Four seasons art project	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-	Visuals Elaborate Read for optional support : A Tree For All Seasons(if purchased) and Watching the Seasons	My Science Notebook pg. 127 #1 & 2

			ESS2-1)		
Seasonal changes over time	-Exploring Science 128 -129 Bill Nye Seasons video Reasons for seasons p129 and Seasons art project	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	ESS2.D: Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	Visuals Elaborate	My Science Notebook pg 129
Represent data in a weather graph *use link or collect almanacs for data	-Exploring Science 130 -131b Online Almanac links: www.weatherbase.com http://myforecast.co/bin/climate.m?city=23432&zip_code=08223&metric=true (*Make sure you are on the Almanac tab and then select historical climate)	3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions	3-ESS2-1. Represent data in tables and graphical displays to	Review Types of graphs Elaborate Visuals	Rubric

		expected during a particular season.	describe typical weather conditions expected during a particular season.		
Difference between Climate and weather	-Exploring Science 132-133 PSI weather/climate slide 7 - 8, then do 6 PSI weather/climate slide 94 - 98 Brain Pop: Climate Types video		ESS2.D: Weather and Climate: Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)	Visuals Differentiated Instruction p133 Closed captions	My Science Notebook pg 133 # 1& 2
Climates in different regions	-Exploring Science 134 - 135 PSI weather/climate slide 99 (video)	3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.		Visuals	My Science Notebook pg. 135 #3

Identify natural hazards	-Exploring Science 136 - 137 Brain Pop: Natural Disasters Video PSI natural hazards slide 11		ESS3.B : Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)	Visuals Elaborate Closed captions	My Science Notebook pg. 137 # 1 & 3
Reducing impact: Floods	-Exploring Science 138 - 139 Brain Pop: Floods *Primary Resource Activity PSI natural hazards slide 28 - 34 Stem Activity: The great flood activity: http://www.teachersareterrific.com/2017/06/floodbarriers.html#more		ESS3.B : Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce	Visuals Elaborate Closed captions	Primary Resource Activity results

			their impacts. (3-ESS3-1)		
Reducing impact: Wind	-Exploring Science 140 - 141 PSI - Toasty Wind Activity (whole class demo) Brain Pop: Wind		ESS3.B: Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)	Visuals Differentiated Instruction p141 Closed captions	Output: Results of Activity and discussion
Reducing impact: Lightning *Make ahead if planning to do Thunderstorm demo- ice cubes made with blue food coloring	-Exploring Science 142 - 143 PSI natural hazards slide 15 - 22 PSI Making Lighting Lab or Super Sparker Make a Thunderstorm *whole class demo Optional Brain Pop: Thunderstorm *FYI & Activities		ESS3.B: Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate	Visuals Elaborate Closed captions	Output: Results of Activity and discussion

			natural hazards but can take steps to reduce their impacts. (3-ESS3-1)		
Think like an Engineer - Design a house to protect from damage. (2 Days)	-Exploring Science 144 - 145b Brain Pop: Hurricane Video	3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.		Visuals Closed captions	Rubric
Understanding Severe-Storms Researcher	-Exploring Science 146 - 147 Magic School Bus -"Kicks up a Storm" video (optional)	3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. Science affects everyday life.		Visuals	My Science Notebook pg. 147 #1 & 2

Review or project Be a Meteorologist	Be a Meteorologist	3-ESS3-1 3-ESS2-2	ESS2.D ESS3.B		study guide or project rubric
Test		3-ESS3-1 3-ESS2-2	ESS2.D ESS3.B		

Materials Needed
Build A Thermometer: 11 oz. plastic bottle, water, Rubbing alcohol, food coloring, clear, plastic drinking straw, modeling clay. Making an anemometer: paper plate, ½ of stick of clay, unsharpened pencil, 2 straws, masking tape, 4 small paper cups (3oz), marker, stopwatch, straight pin, and thermometer. Toasty Wind Activity: Toaster, pinwheel Making Lighting Lab or Super Sparker: scissors, Styrofoam tray, masking tape, aluminum pie tin Make a Thunderstorm: clear, plastic container (size of shoebox), red food coloring, ice cubes made with blue food coloring

SUBJECT: Science
GRADE LEVEL: 3
UNIT TITLE: Life Science/ Cycles
LESSONS: 21

Unit Learning Goals
● Students will be able to explain how and why a habitat of an organism can affect its survival over time. ● Students will be able to determine the difference between inherited traits and environmental effects. ● Students will be able to identify variations of traits. ● Students will be able to explain why variations occur. ● Students will be able to describe how environmental effects can change inherited traits. ● Students will be able to create a model of a plant and animal life cycle. ● Students will be able to compare and contrast the life cycles of plants and animals.

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, G&T	Assessment/Benchmarks
Cold or Warm Environment and Organisms Survival poss. combine 1st 3 lessons	-Exploring Science 76 - 77		LS4.C: Adaptation For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)	Leveled language support p77	My Science Notebook p77 #3
Wet or Dry Environment and Organisms Survival	-Exploring Science 78 - 79		LS4.C: Adaptation For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)	Visuals Elaborate p79	My Science Notebook p79 #3

Light or Dark Environment and Organisms Survival	-Exploring Science 80 - 81		LS4.C: Adaptation For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)	Elaborate p 81 Visuals	My Science Notebook p81 # 2
Construct an Argument	-Exploring Science 82 - 83b	3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.			Rubric
Life cycles	-Exploring Science 84 - 85 Build a terrarium		LS1.B: Growth and Development of Organisms Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)		My Science Notebook p85 #1 & 3
Life Cycle of a Plant - includes Jalapeno Pepper Plant (unique)	-Exploring Science 86 - 87 Brain Pop Jr. Video PSI- Germination Lab *set up lab earlier if possible		LS1.B: Growth and Development of Organisms Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)	Visuals Closed Captions	Brain Pop Jr. Notebook page Output: Results of Lab
Life Cycle of a Ladybug (unique) Life Cycle of a Leopard Frog	-Exploring Science 89-91 Ladybug rearing kit (If purchased)		LS1.B: Growth and Development of Organisms Reproduction is essential to the continued existence of	Elaborate	My Science Notebook p89 & 91 # 1 include illustrations/labels Output: Results of Lab

(unique)			every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)		
Life Cycles *start *Develop a Model* Activity if time allows	-Exploring Science 92 - 93			Visuals Reading Connection activity p93 Elaborate	Life Cycle poster
Develop a Model (Life Cycles) *set up- Environment and Traits	-Exploring Science 94 - 95b	3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.		Visuals Science Background p95b	Rubric
Inherited Traits: Looks	-Exploring Science 96 - 97 Heredity Activity - STEM activity	3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.	LS3.A: Inheritance of Traits Many characteristics of organisms are inherited from their parents. (3-LS3-1) LS3.B: Variation of Traits Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)	Visuals	Observation/data results of Activity
Inherited Traits: Functions	-Exploring Science 98-99	3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits	LS3.A: Inheritance of Traits Many characteristics of organisms are inherited from their parents. (3-LS3-1) LS3.B: Variation of	Visuals	My Science Notebook p99 #1

		exists in a group of similar organisms.	Traits Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)		
Acquired Traits	-Exploring Science 100-103		LS3.A: Inheritance of Traits Many characteristics of organisms are inherited from their parents. (3-LS3-1) Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2) LS3.B: Variation of Traits Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) The environment also affects the traits that an organism develops. (3-LS3-2)	Visuals	My Science Notebook p101 # 1&2
Learning Environment and Traits *set up data sheet/ observe/ discussion (25	-Exploring Science 104 - 107 Wheatgrass Activity	3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	LS3.A: Inheritance of Traits: Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve	Reading Connection activity p105 & 107 Elaborate p107	Output: Results of Lab

min.)			both inheritance and environment. (3- LS3-2) LS3.B: Variation of Traits The environment also affects the traits that an organism develops. (3-LS3-2)		
Environment and Traits *observations/ discussion (15 min.) Survival	-Exploring Science 106 - 109	3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	LS4.B Natural Selection: Sometimes the difference in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	Reading Connection activity p109	Output: Results of Lab
Environment and Traits *observations/ discussion (15 min.) Variation and Mates	-Exploring Science 106 - 107 & 110 - 111	3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	LS4.B Natural Selection: Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	Reading Connection activity p111	My Science Notebook p111 # 1 & 2 Output: Results of Lab
Construct an Explanation	-Exploring Science 112 - 113	3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.		Elaborate p113	My Science Notebook p113 #2

Patterns in Science with a Marine Ecologist	-Exploring Science 114 - 115	3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. Science findings are based on recognizing patterns. (3-LS1-1)		Language support activity p 115	My Science Notebook p115 #1 & 3
Review or project	Project PSI - Virtual Field Lab (Inherited and Traits Unit)	3-LS1-1 3-LS3-1 3-LS3-2 3-LS4-2 3-LS4-3			Project record sheet
Test					

Materials Needed
Build a Terrarium: plastic water bottle with cap, water, soil, seeds Life Cycle of a Plant : PSI- Germination Lab - 9 bean or sunflower seeds, 3 Ziploc bags, 2 paper towels, water, permanent marker Life Cycle of a Ladybug: Ladybug rearing kit (If purchased) Heredity Activity - 25-30 blue plastic Easter eggs, 25-30 green plastic Easter eggs, 25-30 yellow plastic Easter eggs (you can make do with just 10 blue, 10 green, 10 yellow, you will just have to re-use them in each generation), googly eyes (small and big), small pieces of cut up yellow and blue pipe cleaners, 5 identical plastic bins (clear bins work well), any type of confetti

Environment and Traits: Wheatgrass Activity- 2 per group wheatgrass seedlings, spray bottle, water, ruler, masking tape

SUBJECT: Science
GRADE LEVEL: 3
UNIT TITLE: Life Science/Ecosystems
LESSONS: 21

Unit Learning Goals
● Students will identify how animals live; either solitary or in a group. ● Students will understand the advantages and disadvantages of animals living in a group. ● Students will compare and contrast why animal groups are formed. ● Students will be able to explain that habitats include biotic (living) and abiotic (nonliving) factors. ● Students will be able to explain how adaptations help organisms survive. ● Students will be able to understand how fossils indicate changes of environments on Earth.

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, & G&T	Assessment/ Benchmarks
Ecosystems *Great resource link http://www.ducksters.com/science/ecosystems/world_biomes.php	-Exploring Science 38 - 39 -Brain Pop - Ecosystems Video -PSI (Biological evolution slides 5 - 16) Ecosystem postcards		LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	Visuals Closed Caption	Ecosystem Postcards

Forest Change	-Exploring Science 40 - 41 -Brain Popjr: Forests -Brainpop: Wildfires video -PSI (Biological evolution slides 111 - 118)		LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	Visuals Closed Caption	My Science Notebook p41 #1 & 2 Brainpop jr - notebook page (copy in drive folder)

Searching for Water & Change in Temperature	-Exploring Science 42-45 -Brainpopjr: Migration & Hibernation Videos -Brainpop: Migration & Hibernation Videos - PSI (Ecosystem slides 43 - 44 Amazon Fire Ant video)		LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	Visuals Closed Caption Elaborate p43 Video choices Brainpop Activities choices	Brainpop Activity - Brainpop worksheets (copy in drive folder) - Migration Draw it on Brainpop jr

Living Things Make Changes	-Exploring Science 46 - 47		LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)		

People Change Land People Change Ecosystems	-Exploring Science 48 - 51		LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)		My Science Notebook p51

Compare Solutions and Make a Claim	*Set the Scene* –Brain Pop: River Video -Migration pattern of Salmon http://www.ducksters.com/animals/animal_migrations.php -Exploring Science 52 - 55	3-LS4 - 4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*			Comparison Table
Living in Groups	-Exploring Science 56-57 -PSI (Ecosystem slides 4-19) -PSI: Paper Building Challenge		LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)		

-Getting Food -Protection and Defense -Coping with Change	-Exploring Science 58 -63 -PSI: Who has the Advantage Part 1 STEM Actvity -PSI (Ecosystem slides 21-48 if needed)		LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)		Output from Who has the Advantage part 1 activity
Construct an Argument	-Exploring Science 64 - 65	3-LS2-1. Construct an argument that some animals form groups that help members survive.			
What are Fossils?	-Exploring Science 66 - 67 -Brain Pop Jr: Fossils video -Cookie Fossil Activity -Glue Fossil Activity (will need several days to dry)		LS4.A: Evidence of Common Ancestry and Diversity Some kinds of plants and animals that once lived on Earth are no longer found anywhere.	Visuals Closed Caption	Brain Pop Jr - notebook page (copy in drive folder) Output from

			(3-LS4-1) Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)		Cookie fossil Activity
Fossils in different habitats	-Exploring Science 68 - 71 - Brain Pop: Fossil video		LS4.A: Evidence of Common Ancestry and Diversity Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1) Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)	Visuals Closed Caption	My Science Notebook p69 #2 & p71 #3
Fossils	-Exploring Science 72 - 73 Fossil Environment Activity		LS4.A: Evidence of Common Ancestry and Diversity: Fossils provide evidence about the types of organisms		Output: Results of Lab

			that lived long ago and also about the nature of their environments. (3-LS4-1)		
Analyze and Interpret Data	-Exploring Science 74 - 75	3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.		Elaborate 75a Premade table	My Science Notebook p75 #2 & 3
Study Guide or project tunnel book or brochure project (2+ days)		3-LS2-1 3-LS4-1	LS2.C LS2.D LS4.A LS4.D		Rubric
Test		3-LS2-1 3-LS4-1	LS2.C LS2.D LS4.A LS4.D		

Materials Needed
Paper Building Challenge: tag or construction paper (1 package per group), scotch tape PSI: Who has the Advantage Part 1: Several boxes of different sizes Cookie Fossil Activity: heavy duty toothpick, paper plate, hard chocolate chip cookie, paint brush Glue Fossil Activity: white glue, modeling clay 1 stick, small object (ie. sea shell or small twig) Fossil Environment Activity: 4 lumps @¼ cup, different colors of clay (suggested green, yellow, red and tan), 4 small objects (ie. marble, ones base ten block, button, washer), plastic knife, craft stick, tooth pick

SUBJECT: Science
GRADE LEVEL: 3
UNIT TITLE: Forces and Interactions
Lessons: 16

Unit Learning Goals
● Students will describe how and why objects move. ● Students will identify the pattern of an object's motion. ● Students will identify the cause and effect relationships of magnetic force interactions. ● Students will identify the cause and effect relationships of electric force interactions. ● Students will represent design problems that can be solved by using magnets.

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, G&T	Assessment/Benchmarks
Forces and Interactions - Pushes and pulls	-Exploring Science 4-5 **Use Text Features* -Brain pop jr - push and pull video, push and pull activities (Simon says, push and pull sort) -Stem Activity - What Makes Things Move? -PSI Slides 30 - 43 (if needed)	PS2.A Each force acts on one particular object and has both strength and a direction. (3-PS2-1)	PS2.A Each force acts on one particular object and has both strength and a direction. (3-PS2-1)	Visuals Lab Tables/Sheets Small Group Closed Caption	My Science Notebook p5 #1 & 2
Forces and Interactions - Balanced and Unbalanced	-Exploring Science 6-9 **Reading Connection* -PSI slides 44 - 64	PS2.A Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force	PS2.A Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force	Visuals Lab Tables/Sheets Small Group Closed Caption	My Science Notebook pg 9 #3

Forces	-Brainpop: Forces video	on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) PS2.B Objects in contact exert forces on each other. (3-PS2-1)	on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) PS2.B Objects in contact exert forces on each other. (3-PS2-1)	Elaborate	
Forces and Interactions - Balanced and Unbalanced Forces	-Balanced and Unbalanced Forces Lab (PSI) -PSI slide 65	PS2.A Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) PS2.B Objects in contact exert forces on each other. (3-PS2-1)	PS2.A Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) PS2.B Objects in contact exert forces on each other. (3-PS2-1)	Visuals Lab Tables/Sheets Small Group	Output: Results of Lab Slide 66
Forces and Interactions - Changing Direction	-Exploring Science 10 - 11 -Change in Motion - *Science in a Snap Lab p11*		PS2.A Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) PS2.B Objects in contact exert forces on each other. (3-PS2-1)	Visuals Lab Tables/Sheets Small Group Elaborate p11	Output: Results of Lab
Forces and Interactions -	-Exploring Science 12 -13 Think Like a Scientist - Plan an Investigation	3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.		Visuals Lab Tables/Sheets Small Group Elaborate p13b	Rubric

Patterns of Motion - Motion	-Brainpop: Newton's Laws of Motion video -Exploring Science 14 - 17 Marble's Motion Lab		PS2.A The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (3-PS2-2)	Visuals Lab Tables/Sheets Small Group Closed Caption	Output: Interpretation of the marble's pattern of motion
Patterns of Motion -	-Exploring Science 18 - 19 Think Like a Scientist: Make Observations - Trapeze Motion	3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.		Visuals Lab Tables/Sheets Small Group Elaborate p19	Rubric
Magnets	-PSI slides 78 -84 -Exploring Science 20 - 21 -Brainpop: Magnetism Video -Magnetic Interactions Lab (PSI)		PS2.B Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)	Visuals Lab Tables/Sheets Small Group Closed Caption	My Science Notebook pg 21 #2
Magnetic Force	-Exploring Science 22 - 23 Magnetic Force Investigate PSI slides 89 - 94 - Magnetic Racing Activity (PSI)		PS2.B Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)	Visuals Lab Tables/Sheets Small Group Elaborate p 23	Output: Results of Lab
Electromagnets	-Exploring Science 24 - 25 Electromagnets investigate - Brainpop: Electromagnets		PS2.B Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets,	Visuals Lab Tables/Sheets Small Group Closed Caption	Output: Results of Lab

	Video		on their orientation relative to each other. (3-PS2-3),(3-PS2-4)		
Electric Force	-Exploring Science 26 - 27 -Effects of Electric Charge - *Science in a Snap Lab* -PSI slides 96 - 103		PS2.B Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)	Visuals Lab Tables/Sheets Small Group	Ask and Answer Questions for Snap Lab
Electric Force	-Exploring Science 28 - 29 Electric Forces Investigate		PS2.B Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)	Visuals Lab Tables/Sheets Small Group Elaborate p27	Output: Results of Lab
Magnetic and Electric Forces at Work	-Exploring Science 30 -31 Think Like a Scientist : Determine Cause and Effect Relationships Activity	3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.		Visuals Lab Tables/Sheets Small Group Elaborate p31b	Rubric
Forces and Interactions Define and Solve a Problem Meet a Roller Coaster	-Exploring Science 32 - 35 Think Like an Engineer: Define and Solve a Problem (share day 2)	3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes		Elaborate p35 Extra Support - Terms	Rubric

Designer (2 Days)	-Meet a Roller Coaster Designer	specified criteria for success and constraints on materials, time, or cost			
Review? or Learn more about roller coasters - Elaborate 35		3-PS2-2 3-5-ETS1-1	PS2.A PS2.B	Modified Study Guide	Guide or Rubric
Test?			PS2.A PS2.B	Modified Test Read aloud	Test

Materials Needed
Push & Pull Activity- String, Rubber band, Popsicle stick, Ziploc bag, 8x12 sheet of paper, floral stone (1 per group) Balanced and Unbalanced Forces Lab- hair dryer, 2 ping pong balls, marble, 10 blocks, rope, pulley, fishing line, 10 washers, balance scale, chair Change of Motion - small rubber ball, pencil Think Like A Scientist- cotton ball, straw (1 per student), paper towel roll, wooden blocks (various shapes), cardboard boxes or pieces (ramp) Marble's Motion Lab- marble, 3 meters of foam tube (i.e. pipe insulation), masking tape, meter stick, metal mixing bowl (for the Elaborate) Trapeze Motion Lab - 4 metal washer various sizes and weight (per group), string, masking tape, meter stick, stopwatch Magnetic Interactions Lab - 2 bar magnets per team, magnet floating rings and stand, paper clips, pencil, string, various object both magnetic and not (i.e. foil, eraser, screw/nail etc.), magnet influencing compass

Magnetic Force Investigate - 3 bar magnets (2 same size, 1 smaller in size per team), foot ruler, paper clips

Magnetic Racing Activity - 2 bar magnets per team, starting line

Effects of Electric Charge- tissue paper, scissors, balloon full of air, wool cloth

Electric Forces Investigate - 2 balloons filled with air, 2 pieces of string (1m), masking tape, wool cloth

Cause and Effect Activity - metric ruler, graph paper, magnets (various sizes, strength & shape), plastic bag full of paper clips or steel washers, stopwatch, inflated balloon, wool cloth, string, masking tape, plastic bag full of shredded paper or packing peanuts

Think Like an Engineer: Define and Solve a Problem - disc magnets, bar magnets, horseshoe magnets, magnet sheets, magnets with adhesive backs, paper towel roll, binder clips, cardboard boxes or pieces, masking tape, scissors, string, toy cars and recycled materials.

SUBJECT: Nat. Geo. Exploring Science
GRADE LEVEL: 4
MIDDLE TOWNSHIP SCHOOL DISTRICT
2018

Interdisciplinary Connections	21st Century Themes & Skills (Life and Careers)
See Attached Units (5)	*Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively** *Life & Career Skills:* **Initiative & Self-direction: Manage Goals & Time, Work Independently, Be Self-directed Learners** **Social & Cross-cultural Skills: Interact Effectively with Others** **Productivity & Accountability: Manage Products, Produce Results** **Leadership & Responsibility: Guide & Lead Others, Be Responsible**

SUBJECT: Physical Science Unit 1
GRADE LEVEL: 4
UNIT TITLE: Energy
LENGTH OF STUDY: 21 lessons & Unit 1 Assessment

Unit Learning Goals
● Students will be able to use evidence to construct an explanation relating the speed of an object to the energy of that object ● Students will be able to make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. ● Students will be able to ask questions and predict outcomes about the changes in energy that occur when objects collide ● Students will be able to apply scientific ideas to design, test and refine a device that converts energy from one form to another. ● Students will be able to obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	DCI	Modifications SE, ESL, & G&T	Assessment/ Benchmarks
Lesson 1- ● **Batter Up!:** -SWBT define energy. -SWBT Explain how energy can be moved from place to place to moving objects -SWBT connect speed of a moving object to the amount of energy it possesses.	● National Geographic pgs. 4-5 **Extra Resources: -NJCTL Slides "Energy" https://njctl.org/courses/science/4th-grade-science/energy/ -Bill Nye "Energy" -Brainpop- "Energy Sources" -Magic School Bus- "Getting Energized"	**4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Explain how energy can be moved from place to place. **2.**Compare how energy of a fast ball compares with the energy of a changeup.

Lesson 2- • **Kinds of Energy Intro Lesson** -SWBT explains the difference between kinetic and potential energy. **Lesson 3-** • **LAB Speed:** -SWBT use evidence to explain how the speed of an object relates to its energy.	• NJCTL "Energy" slides. **Extra Resources: Brainpop- "Potential and Kinetic Energy" • **LAB Speed:** National Geographic pgs. 6-7	**4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** Describe the less time it takes that ball to roll to the wall, the greater its speed. Describe the speeds of the ball in three trials. **2.** Use results as evidence to explain how the speed of an object is related to its energy.
Lesson 4- • **Energy Forms Intro Lesson** -SWBT describes the different forms of energy and the amount of energy an object has.	• NJCTL "Energy" slides **Extra Resources: Brainpop- "Forms of Energy" Brainpopjr- "Energy Sources"			-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions**

Lesson 5- • **Hit The Ball!** -SWBT recalls that moving objects possess energy. -SWBT describes the transfer of energy that occurs when moving objects collide. **Lesson 6-** • **LAB Motion** -SWBT asks questions about the changes in energy that occur when objects collide. -SWBT predicts outcomes about the changes in energy that occur when objects collide.	• National Geographic pg. 8-9 • **LAB Motion:** National Geographic pgs. 10-11	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-3-** Ask questions and predict outcomes about changes in energy that occur when objects collide	**PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers energy from place to place. (4-PS3-2) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4) **PS3.C: Relationship between Energy and Forces** When objects collide,	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** What two features of motion can change when energy is transferred to an object? **2.** Describe what would happen if you transferred energy to a motionless soccer ball by kicking it. **3.** Infer if the ball's energy increases or decreases when its motion has stopped. • **Exit Ticket/ Science Notebook Response** **1.** Predict what might happen to the energy of the ball if you hit it harder.

			the contact forces transfer energy so as to change the object's' motions. (4-PS3-3)		

Lesson 7- • **Sounds of the Game!:** - SWBT describes energy transfer and collision. - SWBT describes energy transfer and collision. -SWBT recognize that sound possess energy. -SWBT makes an inference about energy conservation during collision. **Lesson 8-** • **LAB Sounds:** -SWBT observes evidence that sound transfers energy.	• National Geographic pg. 12-15 **Extra Resources: -Magic School Bus- "In the Haunted House" Brainpopjr-"Sound" -NJCTL slides • **LAB Sounds:** National Geographic pgs. 14-15	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-3-** Ask questions and predict outcomes about changes in energy that occur when objects collide	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers energy from place to place. (4-PS3-2) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion,	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How does the energy of motion transform into sound? **2.** Explain why covering your ear with your hands reduces the sounds you hear. **3.** Why might a catcher's mitt feel warm after he catches a ball? • **Exit Ticket/ Science Notebook Response** **1.** Did your observations match your predictions? **2**. Describe what happened to the salt grains when you spoke into the tubes loudly/ softly. **3.** Use your observation to give evidence that energy can be transferred from place to place by sound.

			sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)		
Lesson 9- • **The Sun's Light** -SWBT describes light energy. -SWBT recognizes that light transfers energy from place to place. **Lesson 10-** • **LAB Light** - SWBT make observations to provide evidence that energy can be transferred from place to place by light.	• National Geographic pgs. 16-17 **Extra Resources: -Brainpopjr- "Light" and "Heat -NJCTL slides • **LAB Light:** -National Geographic pgs. 18-19 **Extra Resources: -Brainpop- "Heat" and "Sound" -Study Jams "Light" -Magic School Bus- "Gets a Bright Idea"	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-3-** Ask questions and predict outcomes about changes in energy that occur when objects collide	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How is Energy transferred from the sun to the earth? **2.** How does a flashlight help you see at night? • **Exit Ticket/ Science Notebook Response** **1.** Did your results support your prediction and explain. **2.** What might be the result if a clear object were placed on the paper? **3.** Use the observations you made to give evidence that energy can be transferred from place to place by light.

			energy from place to place. (4-PS3-2) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)		
Lesson 11- ● **Heat it Up!** -SWBT recognizes that heat is the transfer of thermal energy. -SWBT defines heat as the transfer of thermal energy. **Lesson 12-** ● **LAB Heat:** - SWBT make observations to provide evidence that energy can be transferred from place to place by heat.	● National Geographic pg. 20-21 ● **LAB Heat:** National Geographic pgs. 22-23 **Extra Resources: -Magic School Bus- "In the Arctic"	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another		-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** What is heat? **2.** In what ways do you use thermal energy every day? **3.** Besides heat, what other forms of energy are transferred by the campfire? ● **Exit Ticket/ Science Notebook Response** **1.** List the cups of water in order from least to most thermal energy. **2.** Did your results support your

					predictions? Explain. **3.** How did the amount of thermal energy in the cups affect the melting of the butter? Use evidence from your observations in your explanation.
Lesson 13- • **"Its Electric"** -SWBT defines electrical energy and electric current. -SWBT recognizes that electric current transfer's energy from place to place. **Lesson 14-** • **Electric Circuits:** -SWBT defines electric circuit. -SWBT knows that the transfer of electric energy as current requires a complete circuit. **Lesson 15-** • **LAB Electric Circuits** -SWBT make observations to provide evidence that energy can be transferred from place to place by electric currents. -SWBT implements an experimental investigation	• National Geographic Pages 24-25 • National Geographic pgs. 26-27 • **LAB Electric Circuits:** National Geographic pgs. 28-29 **Extra Resources: -Study Jams- "Electricity" -Brainpop- "Electricity", "Electric Circuits" -Magic School Bus- "Gets Charged"	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** What is electric current? **2.** Give examples of how electrical energy can be used to produce light, heat, sound, and motion. **3.** What other ways do you use electrical energy every day? • **Exit Ticket/ Science Notebook Response** **1.** How does an electric circuit transfer energy? **2.** What happens to the flow of electric circuit when you flip a light switch off? Explain. • **Exit Ticket/ Science Notebook**

to test one variable-the object/material that completes an electrical circuit.			energy from place to place. (4-PS3-2) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)		**Response** **1.** Did your results support your predictions? Explain. **2.** What materials are needed to build a complete circuit? How are the materials used to complete the circuit? **3.** How can energy be transferred from place to place by electric currents. Use Evidence from the activity in your answer.
Lesson 16- ● **"Spin It!"** -SWBT recall that electrical current can transfer energy from place to place and then be used locally to produce motion, sound, heat, or light. - SWBT explains that current is produced by transforming the energy of motion into electrical energy.	● National Geographic pgs. 30-31 **Extra Resources: -Brainpop- "Current Electricity" -Study Jams "Current Electricity and Electric Circuits" -Bill Nye- "Electrical Current"	**4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric currents **4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another	**PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers energy from place to place. (4-PS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Describe two sources of energy of motion. **2.** How is the energy from the moving blades of the turbines used to produce electricity?

			Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)		
Lesson 17- **Think Like an Engineer -** **"Finding Solutions to Energy Problems"** -SWBT identify an engineering problem, its constraints, and criteria for a solution (May be a week or more)	• National Geographic pgs. 32- 37-	**4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another	**ETS1.A: Defining Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary to 4-PS3-4)*	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** What two problems did T.H. Culhane identify? **2.** How does T.H. Culhane's energy solution make use of available materials?

★ **STEM PROJECT Design, Test and Refine a Device** - SWBT apply scientific ideas to design, test and refine a device that converts energy from one form to another -SWBT define a design problem that includes specified criteria for success and constraints SWBT plan and carry out a fair test to identify aspects of a prototype that can be improved	★ **Design, Test and Refine a Device** National Geographic pgs. 38-43	**4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another	**ETS1.A: Defining Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary to 4-PS3-4)*	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	★ **Exit Ticket/ Science Notebook Response** **1.** What were the variables you tested? **2.** What is the main thing you learned from testing and retesting your design. ★ See Rubric teacher manual pg. 41
Lesson 18- ● **Nonrenewable Energy Resources:** -SWBT explain what the expression "produce energy" refers to -SWBT list energy resources derived from natural sources that are not	● National Geographic Pages 44-45 **Extra Resources: Brainpop "Fossil Fuels" -NJCTL slides	**4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another	**ESS3.A: Natural Resources** Energy and fuel that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Identify four nonrenewable energy resources. **2.** What type of energy is transferred into electricity in nuclear power plants?

renewable over time.			**PS3.D: Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)		**3.** What do people really mean when they say power plant produces energy?
Lesson 19- • **Renewable Energy Resources:** -SWBT list energy resources derived from natural sources that are renewable over time.	• National Geographic Pages 46-47 **Extra Resources: -Brainpop- "Solar Energy" and 'Wind Energy" -Study Jams "Natural Resources" -Brainpop- Natural Resources -NJCTL slides	**4-ESS3-1** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment	**ESS3.A: Natural Resources** Energy and fuel that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** List three renewable energy resources. **2.** How is electricity generation from wind and water similar to electricity generation from fossil fuels?
Lesson 20- • **"Energy Resources and the Environment"** -SWBT recall that the energy we use for electricity and transportation has to come from another source -SWBT compare the effects different energy resources have on the environment	• National Geographic Pages 48-49 **Extra Resources: -NJCTL slides	**4-ESS3-1** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment **4-PS3-4** Apply scientific ideas to design, test, and refine a device that converts energy from one form to	**ESS3.A: Natural Resources** Energy and fuel that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not **PS3.D: Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** Which resource do you think has the greatest disadvantage? Explain. **2.** Is there such a thing as a "clean" fossil fuel? Explain.

		another	conversion of stored energy into a desired form for practical use. (4-PS3-4)		
Lesson 21- ● **Think Like a Scientist** **"Obtain and Combine Information"** -SWBT obtain and combine information to describe that energy is derived from natural resources and their uses affect the environment	● National Geographic pgs. 50-51	**4-ESS3-1** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment		-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** From where do we get energy and fuel? **2.** Infer how the current pattern of US energy consumption affects the environment. **3.** What might happen if the United States continues on its current energy path? Cite evidence from the graphs and you're reading in your answer.
● **Chapter Assessment**	● Teacher Manual pgs. 170-186	**4-ESS3-1** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment **4-PS3-2** Make observations to provide evidence that energy can be transferred from place to place by sounds, light, heat, and electric	**PS3.A: Definitions of Energy** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat.	-Read test to students -small group	● **Book Test**

		currents **4-PS3-3-** Ask questions and predict outcomes about changes in energy that occur when objects collide **4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object	When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) Light also transfers energy from place to place. (4-PS3-2) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4) **PS3.C: Relationship between Energy and Forces** When objects collide, the contact forces transfer energy so as to change the object's' motions. (4-PS3-3) **PS3.D: Energy in Chemical Processes and Everyday Life**		

			The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) **ESS3.A: Natural Resources** Energy and fuel that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not **ETS1.A: Defining Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary*		

			to 4-PS3-4)		

Materials Needed
Speed LAB- Whiffle Ball, Stopwatch, Masking tape (groups of 4) **Motion LAB-** Whiffle Ball, Bat (groups of 4) **Sound LAB-** 9-oz Clear Plastic Cup, Plastic Wrap, Rubber Band, Salt, Paper Towel Tub (groups of 4) **Light LAB-** Colored Construction Paper, Small Classroom Objects (groups of 4) **Heat LAB-** (3)9- Oz. Clear Plastic Cups, (3)Spoons, (3) pieces of butter, marker, masking tape, very warm water, cold water, paper plates (Whole Group) **Electric Circuits LAB-** small flashlight bulbs and holder, battery, 3 wires, rubber band, metal washer, plastic spoon, penny, large paper clip, crayon (groups of 4) ***STEM Design a Device -**thermometers, aluminum foil, plastic wrap, foam core, bubble wrap, rubber bands, pipe cleaners, wide variety of cardboard boxes, clear tape, additional material, black construction paper ***STEM DESIGN a Device-** Electric buzzer, D-cell battery, electrical wire, materials to use as a switch (aluminum foil, washers, metal paper clips, other clips, metal fasteners, clothespins, rubber bands, plastic buttons and lids), small cardboard pieces, electrical tape

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Speed- Math (time measurement) Hit the Ball- Reading visual information (charts, graphs, diagrams, timelines) Sounds of the Game/ Heat it Up!- Word Meaning The Sun's Light/ Making Waves- Main Idea Heat- Explain Procedures and Events Electric Circuits- Inferences/ Interpret Info in Chart Think Like an Engineer- Text Structure Renewable Energy Resources- Details and examples	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Communicate Clearly Collaborate with Others Apply Technology Effectively Work Independently Be Self-Directed Learners Produce Results Use and Manage Information Work Effectively in Diverse Teams Manage Projects Guide and Lead Others

SUBJECT: Physical Science Unit 2
GRADE LEVEL: 4
UNIT TITLE: Waves and Information
LENGTH OF STUDY: 7 Lessons, STEM Project, Unit 2 Assessment

Unit Learning Goals
● Students will be able to develop a model of waves to describe the patterns in terms of amplitude and wavelength and that aves can cause objects to move ● Students will be able to generate and compare multiple solutions that use patterns to transfer information ● Students will be able to define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time or cost ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	DCI	Modifications SE, ESL, & G&T	Assessment/ Benchmarks
Lesson 1- ● **Waves:** -SWBT describe waves as regular pattern of motion produced by a disturbance -SWBT explain the motion of water waves	● National Geographic Pages 52-53 **Extra Resources: -Brainpop- "Waves" -Study Jams "Waves and Currents" -Bill Nye- "Waves" -NJCTL slides https://njctl.org/courses/science/4th-grade-science/waves-light-information/	**4-PS4-1** Develop a model of waves to describe the patterns in terms of amplitude and wavelength and that aves can cause objects to move	**PS4-A: Wave Properties** Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. *(Note: This grade band endpoint was moved from K–2.)* (4-	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Describe how a wave travels across the ocean. **2.** Why doesn't the surfer move forward until she is atop a tall wave?

			PS4-1)		
Lesson 2- • **Wave Properties:** -SWBT describe the wave properties of amplitude and wavelength	• National Geographic Pages 54-55 **Extra Resources: -NJCTL slides	**4-PS4-1** Develop a model of waves to describe the patterns in terms of amplitude and wavelength and that aves can cause objects to move	**PS4.A: Wave Properties** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** What are amplitude and wavelength? **2.** Which transfers more energy; a wave with high amplitude or a wave with a low amplitude?
Lesson 3- • **Wavelength and Amplitude LAB** - SWBT develop a model of waves to describe patterns in terms of amplitude and wavelength **Lesson 4-** • **How Waves Move Objects LAB:** -SWBT develop a model of waves to describe amplitude and wavelength -SWBT use the model to describe how waves cause objects to move	• National Geographic pgs. 56-57 **Extra Resources: -NJCTL slides - "Paper Wave" - LAB NJCTL • **How Waves Move Objects LAB:** National Geographic pg. 58-59 **Extra Resources: -"Longitudinal Waves" Demo NJCTL slides	**4-PS4-1** Develop a model of waves to describe the patterns in terms of amplitude and wavelength and that aves can cause objects to move	**PS4.A: Wave Properties** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** Describe the properties of each wave you modeled. **2.** How can two waves with the same wavelength differ? • **Exit Ticket/ Science Notebook Response** **1.** How did your motions relate to the characteristics of each wave you made.

					2. How did your model show how waves can cause objects to move?
Lesson 5- ● **"Information Technology- GPS":** -SWBT identify digitized information -SWBT describe how information can be transmitted over long distances ● **"Information** **Lesson 6-** ● **Technology- Cell Phones"** -SWBT explain how cell phones use digitized information -SWBT describe the advantages of digitized information **Lesson 7-** ● **"Use a Code" LAB** -SWBT use a pattern to transfer information	● National Geographic pgs. 60-61 **Extra Resources: -NJCTL slides ● National Geographic pgs. 62-63 **Extra Resources: -Study Jams "Sound" ● National Geographic pgs. 64-65	**4-PS4-3** Generate and compare multiple solutions that use patterns to transfer information	**PS4.C: Information Technologies and Instrumentation** Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** What is GPS? **2.** List as many ways you can think of to transmit a message. Which of those do you think use digital code? ● **Exit Ticket/ Science Notebook Response** **1.** Put the following sentences in the correct sequence. (See teacher manual pg. 63 for sentences) **2.** How do radio signals compare with digital signals for transmitting information long distance? ● **Exit Ticket/ Science Notebook**

					Response. **1.** How well did your message transmit? Explain your results. **2.** How does Morse Code compare with digital code as a way of transmitting information?
★ **STEM PROJECT--"Compare Multiple Solutions"-** -SWBT generate and compare multiple solutions that use patterns to transfer information -Determine which of the solutions nest solves the problem, given the criteria and constraints	★ Think Like an Engineer National Geographic Pgs. 66-67			-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** How many different ways did your class come up with to communicate? **2.** Which communication method do you think is most effective? ● See Rubric Teacher Manual pg. 67
● **Chapter Assessment**	● **Teacher Manual pgs. 187-191**	**4-PS4-1** Develop a model of waves to describe the patterns in terms of amplitude and wavelength and that waves can cause objects to move **4-PS4-3** Generate and compare multiple solutions that use patterns to transfer	**PS4.A: Wave Properties** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) **PS4.C: Information Technologies and Instrumentation** Digitized information can be transmitted over long distances	-Read test to students -small group	● **Book Test**

		information	without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)		

Materials Needed
"Wavelength and Amplitude" LAB- Pipe Cleaners and Markers (groups of 4) **"How Waves Move Objects" LAB-** Rectangular Pan or Storage Container, Pitcher of Water to fill half the container, Index Card 4x6 in, Floatable objects (plastic table tennis ball, corks, plastic toys) (groups of 4) **Use a Code LAB-** Flashlight **Optional- "Sound Cup" -LAB-** Plastic Cups, Fishing Line, paper clips, scissors **Optional- "Longitudinal Waves"- LAB-** Slinky **Optional- "Paper Wave"- (LAB)-** 3-4 ft. long paper, markers or crayons, ruler *STEM project Design a Device -National Geographic pgs. 38-43

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Wave Properties- Interpret info in a diagram Waves- Determine Main Idea Think Like an Engineer- Patterns Use a Code- Text Structure How Waves Move Objects- Text Structure Information Technology GPS- Main Idea Information Technology Cell Phones- Use details and examples	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Communicate Clearly Collaborate with Others Apply Technology Effectively Work Independently Be Self-Directed Learners Produce Results Use and Manage Information Work Effectively in Diverse Teams Manage Projects Guide and Lead Others

SUBJECT: Life Science Unit 3
GRADE LEVEL: 4
UNIT TITLE: Structure, Function, and Information Processing
LENGTH OF STUDY: 11 Lessons

Unit Learning Goals
● Students will be able to develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen ● Students will be able to construct an argument that plants and animals have internal and external structures that function to support survival, growth behavior, and reproduction ● Students will be able to use a model to describe that animals receive different types of information through their senses process the information in their brain and respond to the information in different way

Suggested Sequence of Lessons	**Suggested Instructional Activities**	**Performance Expectations**	**DCI**	**Modifications SE, ESL, & G&T**	**Assessment/ Benchmarks**
● **External Animal Structure and Function Intro Lesson** - SWBT identify the structure and function of a duck billed platypus ● **"External Structure of an Elephant"** -SWBT identify that external structures of an elephant -SWBT describe the	● NJCTL "Plant and Animals Structure and Processes" slides 6-15 https://njctl.org/courses/science/4th-grade-science/molecules-to-organisms/ ● National Geographic pgs. 78-79	**4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival, growth behavior, and reproduction	**LS1.A: Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Slide Questions** ● **Exit Ticket/ Science Notebook Response** **1.** How does an elephant's skin help it survive? **2.** How is the

function performed by the external structures of an elephant **"Internal Organs of an Elephant"** -SWBT identify the internal structures of an elephant -SWBT describe the functions served by the internal structures of an elephant ● **Core Function of Animals Intro Lesson** -SWBT describe the core functions of an animal	● National Geographic pgs. 80- 81 ● NJCTL "Plant and Animals Structure and Processes" slides 16 ,17, 18, 20, 23, 24, 25, 26, 27, 29 https://njctl.org/courses/science/4th-grade-science/molecules-to-organisms/attachments/plant-animal-structures-and-processes-presentation/				function of an elephant's trunk like that of a human nose? How is it different? **3.** Which of an elephant's external structures help it live in a herd with other elephants? Explain. ● **Exit Ticket/ Science Notebook Response** **1.** Which internal organs shown on the diagram allow an elephant to take in oxygen? **2.** Place the following organs in the correct order (see teacher manual page 81.) **3.** Select an organ and explain why an

• **Animal Structures Intro Lesson** -SWBT describe the structures of an animal • **Bones And Muscles of an Elephant** -SWBT identify the bones and muscles of an elephant -SWBT describe the functions served by the bones and muscles of an elephant	• NJCTL "Plant and Animals Structure and Processes" slides 32-44 • National Geographic pgs. 82-83 *Resources: -Study Jams- Animal Adaptations				elephant could not survive without it. • **Slide Questions** • **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** Which structure protects the brain of an elephant? **2.** How do bones and skeletal

					muscles work together? **3.** How might thick bones help an animal survive?
• **Plant Structure Intro Lesson** -SWBT describe plant structures and how it helps it survive • **"External Structures of a Wild Rose"** -SWBT identify the external structure of a wild rose -SWBT describe the functions served by the external structures of a wild rose • **"Internal Structures of a Wild Rose"** -SWBT identify the internal structures of a wild rose	• NJCTL "Plant and Animals Structure and Processes" slides 19, 21, 22, 28, 30, 48-61 *Resources -Brainpopjr- "Plant Adaptations" • National Geographic pgs. 72-73 • National Geographic pgs. 74-75	**4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival, growth behavior, and reproduction	**LS1.A: Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** Name five external structures of a rose plant. **2.** How do roots of a rose plant help the plant grow? **3.** Could a rose plant survive without leaves? Why or why not?

-SWBT describe that functions served by the internal structures of the wild rose	Brainpop- "Plant Growth" Brainpop jr.- Parts of a Plant Study Jams- "Plant Adaptations" Bill Nye "Plants"				• **Exit Ticket/ Science Notebook Response** **1.** What are the structures of a leaf? What are their functions? **2.** How do stamens of a flower help a flower reproduce? **3.** Are stems necessary to the survival of a plant. Why?
• **Plant Behavior Intro Lesson** -SWBT describe plant responses	• NJCTL "Plant and Animals Structure and Processes" slides 94-104			-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions**
• **<u>Think Like a Scientist</u>** **"Construct an Argument"** -SWBT construct an argument that plants	• National Geographic pgs. 76-77	**4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival, growth behavior, and reproduction	**LS1.A: Structure and Function** Plants and animals have both internal and external structures that serve various	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual	• **Exit Ticket/ Science Notebook Response**

have internal and external structures that function to support survival, growth and reproduction			functions in growth, survival, behavior, and reproduction. (4-LS1-1)	-Printed slides	**1.** Which of the buttercup plant's structures attract insects that can carry pollen to another flower? **2.** What do you think the inside of the buttercup plant's stem look's like? **3.** Do you think all plants have a way to take in water? Why or why not? **See Rubric pg. 77b
● **<u>Think Like a Scientist</u>** **"Construct an Argument"** -SWBT construct and an argument that animals have internal and external structures that function to support growth and behavior	● National Geographic pgs. 84-85	**4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival, growth behavior, and reproduction	**LS1.A: Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** What type of structures can you see in a wolf's foreleg? **2.** Which structures that an elephant has are not pictured in the photograph on pages 84-85, but you can infer

					a wolf also has? **3.** If the wolf's pelvis was pictured where would it be? **See Rubric pg. 85b
● **Adaptations PROJECT**	● Adaptations Project - see rubric (3-5 days)				● **See Rubric**
● **Information Processing Intro Lesson** -SWBT describe information processing ● **Animal Senses** -SWBT describe how animals use sense receptors, process information, and use perceptions and memories to guide their actions ● **Sight Intro Lesson** -SWBT describe how light helps us see ● **Light and Sight** -SWBT describe how an	● NJCTL "Plant and Animals Structure and Processes" slides 63-71 and 73-86 ● National Geographic pgs. 86-87 ● NJCTL "Waves, Light and Information" slides 82-97 ● National Geographic pgs. 88-89	**LS1-2:** Use a model to describe that animals receive different types of information through their senses process the information in their brain and respond to the information in different ways **PS4-2:** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen	**LS1.D: Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) **PS4-B: Electromagnetic Radiation:** An object can be seen when light reflected from its surface enters the eyes	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Slide Questions** ● **Exit Ticket/ Science Notebook Response** **1.** What senses does a clouded leopard use to know what is in its environment? **2.** How is a clouded leopard's brain related to its senses? ● **Slide**

object can be seen • **How We See LAB:** -SWBT develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen	• **How We See LAB:** National Geographic pg. 90-91 Brainpop- "Eyes" Study Jams- "The Senses- Seeing"				**Questions** • **Exit Ticket/ Science Notebook Response** **1.** What does the word reflect mean? 2. HOw does light from the sun allow an animal to see? **3.** Clouded leopards often hunt at night. How do you think they are able to see objects at night? • **Exit Ticket/ Science Notebook Response** **1.** Use information from

					your model to explain how light from the flashlight reached your eye. **2.** Is it possible to see an object when there is not light? Why or why not?
● **Think Like a Scientist** **"Use a Model"** - SWBT use a model to describe how animals receive, process and respond to information	● National Geographic pgs. 92-93	**LS1-2:** Use a model to describe that animals receive different types of information through their senses process the information in their brain and respond to the information in different ways	**LS1.D: Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** How does a snake detect odors? **2.** What is a similarity in the way all animals process information from their environments? **3.** How do you think a mouse finds its way to its burrow? **See Rubric pg. 93b

• **Memory** -SWBT identify how animals use memory to respond to situations	• NJCTL "Plant and Animals Structure and Processes" slides 87-92 • Case Study	**LS1-2:** Use a model to describe that animals receive different types of information through their senses process the information in their brain and respond to the information in different ways	**LS1.D: Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions**
• **Chapter Assessment**	• Teacher Manual pg. 192-197	**LS1-2:** Use a model to describe that animals receive different types of information through their senses process the information in their brain and respond to the information in different ways **PS4-2:** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen **4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival,	**PS4-B: Electromagnetic Radiation:** An object can be seen when light reflected from its surface enters the eyes **LS1.D: Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) **LS1.A: Structure and Function**	-Read test to students -small group	• **Book Test**

		growth behavior, and reproduction	Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)		

Materials Needed
How We See LAB- Flashlight, Classroom Objects, Shoe Box **Adaptations Project-** Large white paper, computers, colored pencils/ crayons

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
External Structures of a Wild Rose- Explain concepts Internal Structures of a Wild Rose- Interpret information from a diagram External Structure of an Elephant- Main Idea Bones and Muscles of an Elephant- Summarize Animal Sense- Making inferences Light and Sight- Interpret information presented visually How We See- Cause and Effect	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Communicate Clearly Collaborate with Others Apply Technology Effectively Work Independently Be Self-Directed Learners Produce Results Use and Manage Information Work Effectively in Diverse Teams Manage Projects Guide and Lead Others

SUBJECT: Earth Science Unit 4
GRADE LEVEL: 4
UNIT TITLE: Earth Systems: Processes that Shape the Earth
LENGTH OF STUDY: 14 Lessons, STEM Project, Unit 4 Assessment

Unit Learning Goals
● Students will be able to make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem

Suggested Sequence of Lessons	Suggested Instructional Activities	Performance Expectations	DCI	Modifications	Assessment/ Benchmarks
● **Rainfall In the United States** -SWBT describe how the amount of rainfall varies in different parts of the United States -SWBT explain how the amount of rainfall affects the types of living things found in a region	● National Geographic Pgs. 100-101	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** About how much rainfall does the southwest desert region receive? **2.** How is grassland different from a temperate forest? Contrast the amount of rain and the kinds of plants in the two places. **3.** How does the amount of rainfall affect the living things that can live in a region?

• **Pacific Northwest Forest** -SWBT describe how the amount of rainfall affects the types of living things found in the Pacific Northwest Forest -SWBT identify some of the living things in the Pacific Northwest Forest • **Southwest Desert** -SWBT identify some of the living things in the Sonoran Desert -SWBT describe how the aunt of the rainfall affects the types of living things found in the deserts of the Southwestern United States	• National Geographic Pgs. 102-103 • National Geographic Pgs. 104-105 **Resources: Brainpop- Desert • National Geographic Pgs.				• **Exit Ticket/ Science Notebook Response** **1.** What is the weather like in the Pacific Northwest? **2.** What kinds of trees are most common in the Pacific Northwest? **3.** How does the rainfall of the Pacific Northwest affect the variety of plants and animals that live there? • **Exit Ticket/ Science Notebook Response** **1.** What characteristics do animals have that help them survive in the Sonoran Desert? **2.** What characteristics do plants have that help them survive in the Sonoran Desert? **3.** Most amphibians have moist skin and lay their eggs in water.

• **Central Plain Grassland** -SWBT contrast the amount of rain that falls in grassland with the amounts that falls in deserts and forests -SWBT identify some of the organisms that live in a grassland (prairie) • **Eastern Temperate Forest** -SWBT describe the rainfall in an Eastern Temperate Forest -SWBT identify some of the organisms that live in Eastern Temperate Forest	106-107 • National Geographic Pgs. 108-109 **Resources: -BrainPop-Forest				Would you expect there to be many kinds of amphibians in the Sonoran Desert? Explain. • **Exit Ticket/ Science Notebook Response** **1.** What is the weather like in the prairie during the summer? **2.** What is one way in which prairie plants survive the extreme changes in weather? **3.** When do grasslands get most of their rainfall? • **Exit Ticket/ Science Notebook Response** **1.** What are deciduous trees? **2.** How do temperate forests differ from forests found in the Pacific Northwest? **3.** What characteristics of the temperate forest make it a good home for many animals?

-Earth's Systems Intro **Optional	• NJCTL- Earth Systems slides pgs. 4-23 https://njctl.org/courses/science/4th-grade-science/earths-systems/				
• **Mechanical Weathering Intro Lesson** - SWBT describe mechanical weathering • **Weathering** -SWBT define weathering identify agents of weathering -SWBT explain how water and wind can break rocks into smaller particles • **Water Weathers LAB** ****Optional** -SWBT describe how water mechanically weathers rocks	• NJCTL "Earth Systems" slides pgs. 24-43 • National Geographic pgs. 110-111 **Resources: BrainPop-Weathering • **Water Weathers LAB** (NJCTL Earth's Systems) -slide 45	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What can cause weathering? **2.** Describe how weathering might affect rocks? • **Packet Questions**
• **Chemical Weathering Intro Lesson** -SWBT describe chemical weathering • **Modeling Chemical**	• NJCTL- "Earth Systems" slides pgs. 46-61 • **Modeling Chemical Weathering LAB** (NJCTL Earth's Systems)	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Packet Questions**

Weathering LAB -SWBT describe how chemical weathering works	-slide 62 Bill Nye- "Wind"		gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)		
• **Erosion and Deposition Intro** -SWBT compare weathering and erosion • **Erosion and Deposition** -SWBT recognize how erosion and deposition of sediment can shape and change the land • **Weathering and Erosion with Skittles Activity** -SWBT create a model of weathering and erosion	• NJCTL "Earth Systems" slides 64- 80 **Resources: BrainPop-Erosion • National Geographic pgs. 112-113 • **Weathering and Erosion with Skittles Activity** (NJCTL Earth's Systems) -slide 82 Bill Nye- "Erosion" -Magic School Bus- Rocks And Rolls"	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What are some causes of erosion? **2.** How do erosion and deposition change Earth's surface? **3.** Why does erosion occur before deposition? • **Packet Questions**

• **Wind Changes the Land** -SWBT explain how wind can weather rocks to form sediment as well as erode and deposit sediment -SWBT describe how sand dunes form	• National Geographic pgs. 114-115 **Resources: BrainPop-Wind Brainpopjr- "Slow Land Changes"	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How can wind change the shape of rocks? **2.** Explain how sand dunes form? **3.** Identify these two processes as erosion or deposition. Sand dunes form. Wind picks up particles of soil and sand.
• **Water Changes the Land** -SWBT recognize how landforms such as canyons form as the result of erosion by water • **Weathering and Erosion LAB** -SWBT model the processes of weathering and erosion -SWBT describe how	• National Geographic pgs. 116-117 • **Weathering and Erosion LAB:** National Geographic pgs. 118-119	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How can water cause weathering, erosion, and deposition of rock? **2.** How are some canyons a result of changes to Earth's surface by water? • **Exit Ticket/ Science Notebook Response** **1.** How do your results compare to your predictions. Explain. **2.** What processes did

weathering and erosion can change the land					you model in steps 1 and 3? Explain. **3.** Use what you learned in this investigation to explain how rocks in the picture were changed.
• **Ice Changes the Land** -SWBT recognize how some landforms and land features are the result of changes made by ice	• National Geographic pgs. 120-121 **Resources: BrainPop-Glaciers	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How do water and ice affect rock in similar ways? **2.** How does Yosemite Valley shoe that ice changes Earth's surface?
• **Bio geology Intro** -SWBT describe and explain bio geology • **Living Things Change the Land** - SWBT explain how living things can break rocks and soil into smaller particles and move them around to	• NJCTL "Earth Systems" slides 83- 100 • National Geographic pgs. 122-123	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) **ESS2-E: Bio geology:**	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What is an organism? **2.** How can plants break down rocks?

change the land on which they live • **Earth Systems Walk LAB** - SWBT find evidence of weathering, erosion, and biogeology in the world	• **Earth Systems Walk LAB** (NJCTL Earth's Systems) -slide 101 Bill Nye- Rocks and Soil"		Living things affect the physical characteristics of their regions (4-ESS2-1)		• **Packet Questions**
• **Landslides Change Earth's Surface** -SWBT explain the role of gravity and moving soil and rocks around -SWBT define landslide, and explain what causes these movements of rocks and soil	• National Geographic pgs. 124-125	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** How do landslides cause rapid changes to Earth's surface? **2.** What makes material in any landslide move downhill? **3.** How might a landslide affect people?
****STEM PROJECT** • **Think like an Engineer** **"Make Observations"** -SWBT work with a group to design and test a method to reduce the	• National Geographic pgs. 126-129	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation	**ETS1-3: Designing solutions to engineering problems** Testing a solution involves investigating how well it performs	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Exit Ticket/ Science Notebook Response** **1.** What is a fair test? **2.** Why is it important to test only one variable at a time in a fair test?

rate of erosion on a hillside -SWBT use evidence from their test to defend the effectiveness of their method to slowing the rate of erosion			under a range of likely conditions (4-ESS3-2)		**3.** When you designed your test what variable did you observe or measure? What variables did you keep the same? ****Rubric pg. 129**
• **Chapter Assessment**	• Teacher Manual pgs. 198-209	**4ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice,	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) **ESS2-E: Bio geology:** Living things affect the physical characteristics of their regions (4-ESS2-1)	-Read test to students -small group	• **Book Test**

Materials Needed
Water Weathers LAB - soft rocks (limestone, sandstone siltstone, etc.), a plastic juice bottle with a lid that rocks can fit inside, water, an electronic balance (these can usually be borrowed from middle or high school science teachers if you don't have one) **Weathering and Erosion LAB-** 5 pieces of Sandstone, paper towels, pitcher, water, jar with lid (16 oz.), magnifying glass, stopwatch **Weathering and Erosion LAB with Skittles-**colored pencils or crayons, graduated cylinder or any container with 50-100 mL of water, pipette (water dropper), skittles (1 per student), tin pan (or shallow container of any kind) **Model Chemical Weathering LAB-** old penny, ketchup, vinegar **Earth Systems Walk-** (for students to bring along on the walk), paper, writing utensil, something hard to write on

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Rainfall in the United States- Interpret Information in a Map Pacific Northwest Forest- Use details and examples (Reading) Central Plain Grasslands/ Weathering and Erosion- Describe Text Structure Eastern Temperate Forest- Summarize Erosion and Deposition/ Wind Changes the Land- Determine Word Meaning Ice Changes the Land- Draw Inferences Landslides Change Earth's Surface- Understand Cause and Effect Relationships Think Like an Engineer- Cause and Effect	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Communicate Clearly Collaborate with Others Apply Technology Effectively Work Independently Be Self-Directed Learners Produce Results Use and Manage Information Work Effectively in Diverse Teams Manage Projects Guide and Lead Others

SUBJECT: Earth Science Unit 5
GRADE LEVEL: 4
UNIT TITLE: Natural Hazards
LENGTH OF STUDY: 15 Lessons, STEM Project, Unit 5 Assessment

Unit Learning Goals
● Students will be able to generate and compare multiple solutions to reduce the impacts of natural earth processes on humans ● Students will be able to analyze and interpret data from maps to describe patterns of Earth's features ● Students will be able to identify evidence from patterns in rock formation and fossils in rock layers to support an explanation for changes in a landscape over time

Suggested Sequence of Lessons	**Suggested Instructional Activities**	**Performance Expectations**	**DCI**	**Modifications SE, ESL, & G&T**	**Assessment/ Benchmarks**
● **Intro Natural Hazards Lesson** -SWBT explain what a natural hazard does to the earth ● **Identify Natural Hazards:** -SWBT identify some natural hazards -SWBT explain why earthquakes, tsunamis, and volcanic eruptions can	● NJCTL "Natural Hazards" slides 4-19 https://njctl.org/courses/science/4th-grade-science/natural-hazards/ ● National Geographic pg. 130-131 **Resources: -Magic School Bus- Kicks Up A Storm" -Brainpopjr- "Fast Land Changes"	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Slide Questions** ● **Exit Ticket/ Science Notebook Response** **1.** What does the word hazard mean? **2.** What are three of the natural processes that can be hazardous to humans?

be hazardous events					**3.** Why might a volcanic eruption be dangerous for airline traffic?
● **Intro Earthquakes Lesson** -SWBT ● **Earthquakes:** -SWBT describe earthquakes -SWBT identify the hazards to humans that result from earthquakes ● **LAB Earthquake:** -Define liquefaction -Model what happens during liquefaction	● NJCTL "Natural Hazards" slides 20-49 ● National Geographic pg. 132-133 **Resources: BrainPop-Earthquakes **LAB Earthquake:** ● National Geographic pgs. 134-135	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Slide Questions** ● **Exit Ticket/ Science Notebook Response** **1.** What is a fault? **2.** How can an earthquake affect structures built by humans? Give three examples. **3.** How might an earthquake affect people's ability to get from place to place? ● **Exit Ticket/ Science Notebook Response** **1.** What did the block represent? What did hitting the pan with the

• **Shake It Up! LAB**	• **Shake It Up! LAB** (NJCTL Natural Hazards) -slide 125				mallet represent? **2.** How did hitting the pan with the mallet affect the block? **3.** How could you change the model to test ways to make buildings constructed on sand or mud more stable? Write your plan. Include a diagram of how your test would work. • **Packet Questions**
• **Intro Tsunamis** • **Tsunamis:** -Explain why Tsunamis can be hazardous -Describe Tsunamis damages	• NJCTL "Natural Hazards" slides 93-112 • National Geographic pg. 136-137 **Resources: BrainPop-Tsunamis	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What are three events that cause tsunamis? **2.** How do some tsunamis change when they reach land?

					3. Why are tsunamis dangerous?
• **Volcano Intro** • **Volcanoes:** Explain that volcanic eruptions are natural hazards -Describe some types of damages caused by volcanic eruptions	• NJCTL "Natural Hazards" slides 51- 88 • National Geographic pg. 138-139 **Resources: Magic School Bus- "Blows Its Top" BrainPop-Volcanoes	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What are some of the hazards caused by erupting volcanoes? **2.** What is the difference between magma and lava? **3.** What were the effects of the most recent volcanic eruption closest to where you live?
• **Minimizing Damage Intro** • **Reduce the Impact of Natural Hazards:** -Explain how people can reduce some of the	• NJCTL "Natural Hazards" slides 113- 123 • National Geographic pg. 140-141	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response**

impacts of earthquake					**1.** What features can help protect the bridge from earthquake damage? **2.** The features that help keep bridges safe during an earthquake also make the bridges more expensive. Do you think all bridges should have these features?
● **Early Warning Systems:** -Explain how people can reduce some of the impacts of natural hazards	● National Geographic pg. 142-143	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** What information do scientists collect to monitor volcanoes? **2.** How is the information used to reduce the impact of volcanic eruptions?
● **Tsunami Detection:** - Explain how a warning system can alert people to possible Tsunamis -Interpret a diagram to	● National Geographic pg. 144-145	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual	● **Exit Ticket/ Science Notebook Response** **1.** How do scientists detect

explain how the warning system works			steps to reduce their impacts (4-ESS3-2)	-Printed slides	tsunamis? **2.** Why are satellites useful in predicting tsunamis?
• **Earth's Visible Features Intro** • **Patterns of Earth Features INTRO** • **Patterns of Water and Land Features:** -Interpret a map to identify the location of some land and water features on Earth -Recognize that these features occur in patterns	• NJCTL "History of Earth" slides 80- 93 • NJCTL "History of Earth" slides 95-106 • National Geographic pg. 146-147	**ESS2-2** Analyze and interpret data from maps to describe patterns of Earth's features	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What symbol on the map represents a mountain range? How does the location of the mountain range in South America differ from that of the main mountain range in Asia?

					2. What symbol represents a deep ocean trench? The Mariana Trench is the deepest trench on Earth. In which ocean is it located? Which continent is located to the west of the trench? Use the compass rose to help. **3.** Describe the location of the East Pacific Rise.
● **<u>Think like a Scientist-</u>** -Analyze and interpret data from maps to describe patterns on Earth's features	● National Geographic pg. 148-149	**ESS2-2** Analyze and interpret data from maps to describe patterns of Earth's features	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Which symbol on the map represents an active volcano? Which symbol represents a major earthquake? **2.** Describe the pattern in the location of the active volcano. 3. Where do most earthquakes take place? **4.** Compare the locations of

					earthquakes and volcanoes. What pattern do you see?
● **Think like an Engineer- Case Study** -Identify some of the hazards resulting from earthquakes -Describe two ways that engineers have devised to help reduce the impact of hazards from earthquakes	● National Geographic pg. 150- 153	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans	**ESS3-B: Natural Hazards** A variety of hazards result from natural processes(earthquakes, tsunamis, volcanic eruptions). Humans can not eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** Describe how a building is constructed using the core-suspended isolation system. **2.** How does CSI lessen the impact of an earthquake? **3.** How are base isolation and core-suspended isolations systems related?
● **Think like an Engineer-** -Generate and compare multiple solutions to reduce the impacts of earthquakes on humans -Test the solutions to investigate how well they perform under a range of likely earthquake conditions	● National Geographic pg. 154-157	**4-ESS3-2** Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans **3-5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problems	**ETS1-3: Designing solutions to engineering problems** Testing a solution involves investigating how well it performs under a range of likely conditions (4-ESS3-2)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** How did your model house meet the criteria and constraints agreed upon by the class for this design challenge? **2.** How do you know that your

(STEM PROJECT) • **Design Challenge: Earthquake Resistant Building**	• **Design Challenge: Earthquake Resistant Building** (NJCTL Natural Hazards) -slide 136				second test of the building was a fair test? **3.** How do the results of your two tests compare? Were you able to improve the design of your model home to better resist damage caused by a model earthquake? Explain. **See Rubric pg. 157 • **Packet Questions** • **Rubric**
• **Structure of the Earth Intro** • **The Badlands:** -Describe how patterns in rock formation in Badlands region South Dakota Reveals changes over time -Explain fossil location in the Badlands' rock to indicate rock layers	• NJCTL "History of Earth" slides 10- 15 • National Geographic pg. 158-159 **Resources: BrainPop-Sedimentary rock BrainPop-"Fossils" Brainpopjr- Rocks and Minerals" and "Fossils"	**4-ESS1-1:** Identify evidence from patterns in rock formation and fossils in rock layers to support an explanation for changes in a landscape over time	**ESS1.C: The History of Planet Earth** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What is a fossil? **2.** How do the layers of

					sedimentary rock form? Where the oldest layers are usually found? **3.** Scientists find two layers of sedimentary rock. One layer contains a fossil of a palm tree. The other layer contains an ammonite fossil. Which layer is older? Explain.
● **Iceland:** -Describe how Earth forces are changing rocks in Iceland	● National Geographic pg. 160-161	**4-ESS1-1:** Identify evidence from patterns in rock formation and fossils in rock layers to support an explanation for changes in a landscape over time	**ESS1.C: The History of Planet Earth** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	● **Exit Ticket/ Science Notebook Response** **1.** How are volcanic forces changing Iceland? **2.** Why does Iceland have so much volcanic activity? **3.** What does Iceland's rift valley reveal about the Earth's forces?
● **Rock Layers Lesson** -Identify different rock layers	● NJCTL "History of Earth" slides 16- 28	**4-ESS1-1:** Identify evidence from patterns in rock formation and fossils in rock layers to support an explanation for changes in a	**ESS1.C: The History of Planet Earth** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher	● **Slide Questions**

• **"Rock Layers" Lab** ****optional**	• **"Rock Layers" Lab** (NJCTL History of Planet Earth) -slide 29	landscape over time	presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	manual -Printed slides	• **Packet Questions**
• **Fossils and Relative Time Intro** • **<u>Think Like a Scientist-</u>** -Identify evidence from patterns in rock formations that make up the Grand Canyon to explain how it changes over time -Identify evidence from fossils in the rock layers that make up Grand Canyon to explain how it changed over time • **"Sediment Fossil**	• NJCTL "History of Earth" slides 30-42 • National Geographic pg. 162-165 • **"Sediment Fossil Surprise"** (NJCTL History of Planet Earth)	**4-ESS1-1:** Identify evidence from patterns in rock formation and fossils in rock layers to support an explanation for changes in a landscape over time	**ESS1.C: The History of Planet Earth** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	-Visuals, -Lab Tables/ Sheets -Small Group -Closed Caption -"Elaborate" found in teacher manual -Printed slides	• **Slide Questions** • **Exit Ticket/ Science Notebook Response** **1.** What kinds of rocks make up the youngest layers shown in the diagram? Which rocks make up the oldest layers? **2.** Use evidence from the diagram and what you know about sedimentary rocks to place these steps in order from first to last. (see teacher manual pg. 165)

Surprise"	• slide 43 • Presentation				**3.** Use evidence from the diagram to explain how the landscape changed over time. • **Packet Questions**
• Rock formation and Earth Forces **<u>*Optional</u>**	• NJCTL "History of Earth" slides 45-64				• **Slide Questions**

Materials Needed
Earthquakes LAB- Sand, Water, Wooden Block, Plastic Pan, Mallet (hammer) **Rock Layers LAB-** (for each station) gravel, sand, top soil, graduated cylinder, water, spoon, stopwatch / timer, small bowl, plastic water bottle, cut in half (bottom half), watered-down white glue, toothpicks **Sediment Fossil Surprise LAB-** (enough for each student to make a model) Clear cup or bowl, Variety of baking ingredients, Variety of snack foods, Blank sheets of paper, Pencils, Markers, Scissors (for preparing ingredients as fossils), Spoons (for creating model) **Shake It Up! LAB-** pipe cleaners, popsicle sticks, tape, string, paper clips, cardboard, scissors ****STEM PROJECT: Design Challenge: Earthquake resistant Building LAB-** Pipe cleaners, Popsicle sticks, Tape, String, Paper Clips, Cardboard, Scissors, Marshmallows, Toothpicks, Round beads

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Natural Hazards- Determine Word Meaning Tsunamis- Explain Concepts Volcanoes- Describe Text Structure Early Warning Systems- Summarize Tsunami Detection/ Patterns of Water and Land Features/ Badlands- Interpret Information Presented Visually Think Like a Scientist (Analyze and Interpret Data)- Patterns Think like an Engineer- Cause and Effect	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Communicate Clearly Collaborate with Others Apply Technology Effectively Work Independently Be Self-Directed Learners Produce Results Use and Manage Information Work Effectively in Diverse Teams Manage Projects Guide and Lead Others

SUBJECT: Science
GRADE LEVEL: 5
UNIT TITLE: Ecosystems Dynamics
LENGTH OF STUDY: about 20 Days
NUMBER OF LESSONS: 20

Unit Learning Goals

Topic	Suggested Sequence of Lessons	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, & GT	Assessment/ Benchmarks
Food Chain	Brainpop - Food Chains (make a map activity to create example of food chain) Various food chains from different ecosystems Shark Food Chain Craft Exploring Science pg. 66-69	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	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. LS1.C Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for motion.	Visuals Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher guide) research marine food chain	Output: Compare & contrast food chains in different ecosystems
Think Like a Scientist - Make and present a model food chain	Exploring Science pg. 70-71 Study Jams - Food Chains	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	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.	Visuals Enrichment - compare & contrast food chains with a partner	Output: Model food chain
Food Webs - Producers	PSI Slides 4-13 Super Teacher w/s - identify producers, consumers &	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1	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 plants for	Visuals Small Group Closed Caption Enrichment -	Output: Student Teacher Worksheet - identifying

	decomposers Exploring Science pg. 72-73 National Geographic Reader - African Savanna (Living on the African Savanna)	Develop a model to describe the movement of matter among plants, animals, decomposers, and	food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.	(*Elaborate* section in Exploring Science teacher guide) research more desert animals and expand desert food web	producers, consumers & decomposers Infer - how might the loss of hawks affect the other animals in the area?
Food Webs - Levels of Consumers	PSI Slides 14-25 Study Jams - Food Webs Super Teacher w/s - classify consumers	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	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. LS1-C Plants acquire their material for growth chiefly from air and water.	Visuals Small Group Closed Caption	Output: Student Teacher Worksheet - classifying consumers
Food Webs - Decomposers	PSI Slides 30-45 Testing Decomposition Videos (on slides) Exploring Science pg. 74-75 Magic School Bus Leaf-Decay contraption?	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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	Visuals Lab Tables/Sheets Small Group Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher guide) what happens to materials you put into a compost pile?	Output: Explain process of decomposition and where it ties into food webs

			different types are each able to meet their needs in a relatively stable web of life.		
Food Webs - analyze / connect sample food webs	PSI Slides 26-29 Activity - Build the Food Web Super Teacher w/s	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.	Visuals Small Group	Output: Fill out sample food web
Food Webs - Create Own Food Web	Bill Nye - Food Webs	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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	Visuals Graphic Organizers Closed Caption	Output: Create food web of a given ecosystem (poster) - 2 days

			relatively stable web of life.		
Conservation of Mass in Food Webs	PSI Slides 46-54 Brainpop - Energy Pyramid	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.	Visuals Graphic Organizers Closed Caption Enrichment - brainpop make a movie of energy going up pyramid	Output: Illustration of Energy Pyramid
Cycles of Matter	PSI Slides 55-68 Exploring Science pg. 76-77	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	LS2.B 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 back into the environment.	Visuals Enrichment - (*Elaborate* section in Exploring Science teacher guide) how do human activities affect cycles of matter?	Output: Illustrate flow chart to show cycle of matter Sequence - microscopic decomposers, plant, rabbit
Tallgrass Prairie Ecosystem	Exploring Science pg. 78-79	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth,	LS2.A The food of almost any kind of animal can be traced back to plants. Organisms are	Visuals Enrichment - compare & contrast	Output: Physical characteristics

		motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 and therefore operate as decomposers. Decomposition eventually restores 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.	major ecosystems	of ecosystem / identify living & nonliving things that survive there
Ecosystems - Individual, Population, Community, Ecosystem	Brainpop - Ecosystems w/activity page / make-a-movie Exploring Science pg. 80-81	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.	Visuals Graphic Organizers Small Group Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher guide) how does having many different species make an ecosystem healthy?	Output: Example of community in given ecosystem
Maintaining an Ecosystem	PSI Slides 69-76 Brain Pop - Ecosystems Ecosystem Brochure	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	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 plants for	Visuals Graphic Organizers Small Group	Output: Brochure - what animals you will find in a

	(can use brain Pop on specific biomes/ecosystems)	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.		given ecosystem and how to keep it a healthy ecosystem (2 days)
Interactions in a Model Pond	Exploring Science pg. 82-83	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	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.	Visuals Lab Sheets Small Group	Output: Lab Observations
Think Like a Scientist - Develop a model to describe the movement of matter	Exploring Science pg. 84-85 (Develop a model to describe movement of matter)	LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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. LS2.B	Visuals Graphic Organizers Small Group	Output: Matter Model

			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 back into the environment.		
Overpopulation / Overhunting	PSI Slides 77-86 National Geographic Reader - African Savanna (Saving Big Cats & Elephant Orphanage)	LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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.	Visuals Small Group Closed Caption Enrichment - Examples of overpopulation and overhunting in specific ecosystems	Output: how overpopulation / overhunting would affect an ecosystem
Invasive Species - how affect environment	PSI Slides 87-89 Exploring Science pg. 86-91 National Geographic Reader - The Galapagos Islands	LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	LS2.A Newly introduced species can damage the balance of an ecosystem.	Visuals Small Groups Enrichment - research invasive plant that grows in their region	Output: Infer - what would happen if you planted an invasive plant near your home?
Unit Review	Study Guide	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	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.	Modified Study Guide	Guide

		LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	LS1.C Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for motion. Plants acquire their material for growth chiefly from air and water. 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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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. LS2.B 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 back into the environment.		
Unit Test	Test	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	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.	Modified Test	Test

		LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.	LS1.C Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for motion. Plants acquire their material for growth chiefly from air and water. 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 plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms and therefore operate as decomposers. Decomposition eventually restores 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. LS2.B 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 back into the environment.		

Materials Needed
Model Pond - clear plastic bottle, sand, small rocks, Elodea, water, spoon, 3 snails, hand lens

Interdisciplinary Connections	21st Century Themes & Skills (Life and Careers)
Flow chart of cycle of matter - Language Arts (sequencing / cause & effect) Creating sample food chains & webs - Language Arts (sequencing / cause & effect / compare & contrast) Energy Pyramid - Language Arts (sequencing / cause & effect) Brochure - Writing Invasive Species - Writing (cause & effect) Overpopulation / Overhunting - Math (computation) Model Pond - Language Arts (predictions, cause & effect, drawing conclusions)	*Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively** *Life & Career Skills:* **Initiative & Self-direction: Manage Goals & Time, Work Independently, Be Self-directed Learners** **Social & Cross-cultural Skills: Interact Effectively with Others** **Productivity & Accountability: Manage Products, Produce Results** **Leadership & Responsibility: Guide & Lead Others, Be Responsible** Global Awareness Environmental Literacy

	Use System Thinking Communicate Clearly Collaborate with Others Work Independently Be Self-Directed Learners Interact Effectively with Other Be Responsible to Others

SUBJECT: Science
GRADE LEVEL: 5
UNIT TITLE: Earth's Systems
LENGTH OF STUDY: about 20 Days
NUMBER OF LESSONS: 1-19

Unit Learning Goals

- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.
  - 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)
- Describe and graph the amounts of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
  - Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

Suggested Sequence of Lessons	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, & GT	Assessment/ Benchmarks
Introduce Earth's Major Systems	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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,	Visuals Graphic Organizers Small Group Enrichment - (*Elaborate* section of Exploring Science teacher guide) How might the action of waves on the ocean affect the sand on a beach?	Output: Jigsaw sphere to share with group

		shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)		
Geosphere - processes and events that constantly change the shape of land	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Graphic Organizers Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) How might the erosion of sediments by water change shape of Earth's geosphere?	Output: Cut & Paste Layers Brainpop Quiz
Geosphere - Model of structure / layers	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Closed Caption Enrichment - How might the wind affect the rocks along a cliff?	Output: Sphere Poster / Thing Link
Hydrosphere	ESS2-1 Develop a model using an example	ESS2.A Earth's major systems are the	Visuals	Output: Add

	to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	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)	Graphic Organizers Small Group Closed Caption	Hydrosphere to Poster / Thing Link
Atmosphere Make-up	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Closed Caption Enrichment - How is the atmosphere connected to daily weather?	Output: Chart of gases in the atmosphere Add Atmosphere to Poster / Thing Link
Atmosphere Layers	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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	Visuals Closed Caption Enrichment - research more facts about the layers	Output: Illustration of Layers of the Atmosphere

		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)		
Biosphere	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research ecological communities in a certain biome	Output: Sphere Poster or ThingLink
Sphere Interactions - specific example...how monsoons affect Earth's spheres	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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.	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research monsoons	Output: Examples of sphere interactions (News Report)

		(5-ESS2-1)		
Sphere Interactions - model interaction among Earth's systems	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) compare terrarium to local ecosystems	Output: Terrarium model
Ocean Ecosystem	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Small Group Closed Caption Enrichment - why might fish have adaptations that give off light?	Output: Make a map on Brainpop of ocean ecosystems and species found in each
Ocean Shapes Land	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere,	ESS2.A 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,	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of	Output: how ocean affects land (shoreline) Analyze - How might larger waves affect the amount of erosion on a

	hydrosphere, and atmosphere interact.	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)	Exploring Science teacher guide) research barrier islands	beach?
Ocean Affects Climate	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research Gulf Stream temperatures	Output: how ocean currents affect climate
Landforms and Weather Patterns	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research weather patterns in various cities (compare)	Output: Illustrations & description of rain shadow effect

		clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)		
Atmosphere & Landforms	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) limestone formations	Output: How acid rain affects landforms
Think Like a Scientist - Develop a model to describe an interaction between two of Earth's spheres	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.	ESS2.A 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)	Visuals Small Group Enrichment - compare & contrast models with classmate	Output: Earth's Spheres Model (2 days)
Water on Earth	ESS2-2 Describe and graph the amounts of water and	ESS2.C Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or	Visuals Small Group Closed Caption	Output: Make a Map on Brainpop about the Water Cycle

	fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)	Enrichment - (*Elaborate* section of Exploring Science teacher guide) compare & contrast continental & valley glaciers / how are they formed	
Graphing Water Data	ESS2-2 Describe and graph the amounts of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	ESS2.C Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)	Visuals Graphic Organizers Lab Sheets Small Group Enrichment - use data to contrast amount of groundwater and amount of water frozen in glaciers	Output: Numbers App Water Chart
Unit Review	ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact. ESS2-2 Describe and graph the amounts of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	ESS2.A 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)	Modified Study Guide	Guide / Finished poster or ThingLink
Unit Test	ESS2-1 Develop a model using	ESS2.A Earth's major systems are the geosphere (solid and molten	Modified Test	Test

	an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact. ESS2-2 Describe and graph the amounts of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	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)		

Materials Needed
Terrarium - clear plastic bottle (2 liter), gravel, soil, plastic spoon, small plants, water, masking tape

Interdisciplinary Connections	21st Century Themes & Skills (Life and Careers)
Graphing Water Data - Math (Scale, Proportion, and Quantity) Atmosphere Make-up - Math (Scale, Proportion, and Quantity of pie chart) Sphere Interactions Examples & Model - Language Arts (sequence of events, cause & effect, compare & contrast) National Geographic Readers - Language Arts Global Awareness Environmental Literacy Think Creatively Use System Thinking Communicate Clearly	*Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively**

Collaborate with Others Create Media Products Apply Technology Effectively Work Independently Be Self-Directed Learners Interact Effectively with Other Manage Projects Be Responsible to Others	*Life & Career Skills:* **Initiative & Self-direction: Manage Goals & Time, Work Independently, Be Self-directed Learners** **Social & Cross-cultural Skills: Interact Effectively with Others** **Productivity & Accountability: Manage Products, Produce Results** **Leadership & Responsibility: Guide & Lead Others, Be Responsible**

SUBJECT: Science
GRADE LEVEL: 5
UNIT TITLE: Energy in Organisms
LENGTH OF STUDY:
NUMBER OF LESSONS: 14 Lessons

Unit Learning Goals

- Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.
    - Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter.
- Support an argument that plants get the materials they need for growth chiefly from air and water.
    - Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for motion.
- Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
    - The food of almost any kind 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.
    - Decomposers, such as fungi and bacteria, break down dead organisms. 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 different types are each able to meet their needs in a relatively stable web of life.
    - Newly introduced species can damage the balance of a healthy ecosystem.
    - 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 back into the environment. (cycle of matter / energy transfer)

Lesson Topics	Instructional Activities	Performance Expectations	DCI	Modifications	Assessment/ Benchmarks
What Plants Need	PSI Slides 31-36 Photosynthesis Materials Study Jams - Photosynthesis Exploring Science pg. 50-51	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter.	Visuals Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher guide) research example of epiphyte	Output: Plant Picture of Photosynthesis
Energy Use in Plants	Bill Nye - Sun Energy Sun Craft	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter.	Visuals Graphic Organizers Closed Caption	Output: Energy Sun
How Plants Get Energy	PSI Slides 37-45 Exploring Science pg. 52-53 Brainpop - Photosynthesis (make a map activity)	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter.	Visuals Graphic Organizers Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher guide) research different kinds of organisms that carry out photosynthesis (autotrophs)	Output: Brainpop Make a Map showing how plants get their energy

Materials for Plant Growth	PSI Slides 47-51 (video on slide) Exploring Science pg. 54-55	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water.	Visuals Graphic Organizers Enrichment - (*Elaborate* section in Exploring Science teacher guide) find how trees & plants affect level of CO2 in the air	Output: Flow Chart Analyze - Do fertilizers "plant foot" provide a plant with energy?
Photosynthesis in a Plant Leaf	Leaf Model	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water.	Visuals Small Group	Output: Leaf Model
Think Like an Engineer: Problem - Growing Crops	Exploring Science pg. 56-57	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	LS1.C Plants acquire their material for growth chiefly from air and water. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B	Visuals Small Group Enrichment - (*Elaborate* section in Exploring Science teacher guide) Hydroponics in	Output: How can people grow crops where there is not enough land with good soil?

		ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	cities	
Think Like an Engineer: Solution - Hydroponics	Exploring Science pg. 58-59	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	LS1.C Plants acquire their material for growth chiefly from air and water. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	Visuals Small Group Enrichment - (*Elaborate* section in Exploring Science teacher guide) Hydroponics in space	Output: Compare way plants grow in soil and plants grown by hydroponics

Hydroponics Lab	Exploring Science pg. 60-61 (Lab)	LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model that can be improved.	LS1.C Plants acquire their material for growth chiefly from air and water. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.C Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	Visuals Lab Tables/Sheets Small Group	Output: Lab Results
Think Like a Scientist - Argument that describes where plants get materials to live and grow	Exploring Science pg. 62-63	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water.	Small Group	Output: Supported argument
Why Animals Need Food	PSI Slides 18-23 Exploring Science pg. 64-65	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	LS1.C Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for motion.	Visuals Enrichment - Infer (warm-blooded vs cold-blooded animals need / energy use)	Output: Where do animals get materials to grow / how use energy
Why do we need energy?	Comic Life with Partner (Body repair, warmth, motion, growth)	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun.	LS1.C Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth for	Graphic Organizers Small Group	Output: Comic Life

		LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	motion.		
Unit Review	Larry the Leaf Comic Strip - Describing Energy Flow & Photosynthesis	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water.	Visuals Graphic Organizers Small Group	Output: Comic Strip describing energy flow & photosynthesis
Unit Review	Super Teacher Worksheets - A Tree is Like a Hungry Kid Study Guide	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water. Foods provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.	Modified Study Guide	Guide
Unit Test	Energy in Organisms Test	PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and warmth) was once energy from the sun. LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.	PS3.D Energy released from food was once energy from the sun that was captured by plants in the chemical processes that forms plant matter. LS1.C Plants acquire their material for growth chiefly from air and water. Foods provides animals with the materials they need for body repair and growth and	Modified Test	Test

			the energy they need to maintain body warmth and for motion.		

Materials Needed
• National Geographic Learning: Exploring Science (Grade 5) • www.myngconnect.com • Hydroponics Lab • clear plastic container with hole in middle • young plant • cotton • water • liquid • houseplant fertilizer

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Think Like a Scientist - Writing (support an argument that explains where plants get materials they need to live and grow) Hydroponics Lab - Writing (lab conclusions) Growing Crops - Language Arts (compare & contrast) Comic Strip & Photosynthesis Flow Chart - Language Arts (sequence of events)	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Make judgments and Decisions Communicate Clearly Collaborate with Others Apply Technology Effectively Be Flexible Work Independently Be Self-Directed Learners Work Effectively in Diverse Teams Manage Products Produce Results Guide & Lead Others *Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively**

SUBJECT: Science
GRADE LEVEL: 5th
UNIT TITLE: Human Impacts
LENGTH OF STUDY: 25 Days
NUMBER OF LESSONS: 19 Lessons

Unit Learning Goals

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

Suggested Sequence of Lessons	Instructional Activities	Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, & GT	Assessment/ Benchmarks
Renewable vs. Nonrenewable resources	Exploring Science pg. 128-129 Brain pop - Natural Resources National Geographic Reader - Power Up PSI Slides	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research local natural resources	Output: Apply - List & share 3 ways you use renewable & nonrenewable resources
Geological evidence of how humans have changed the	PSI Slides 4-21 Brain pop -	ESS3-1 Obtain and combine information about ways individual communities use	ESS3.C Human activities in agriculture, industry, and everyday life have had	Visuals Small Group Closed Caption	Output: Geological Evidence of how we negatively impact

Earth	Fossil Fuels	science ideas to protect the Earth's resources and environment.	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)		the environment
Ecological Footprint	PSI Slides 22-36 Measure Own Ecological Footprint	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Graphic Organizers Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) relate lorax to current environmental problem	Output: Own Footprint on Environment Lorax & Oncelers Footprints
Humans Impact the Land	Read Lorax by Dr. Seuss Lorax vs. Onceler Ecological Footprints PSI Slides 37-48	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) impact of fertilizers and pesticides have on land	Output: Apply - Identify 3 features near your home that are examples of people changing land
Humans Impact Vegetation	Exploring Science pg.	ESS3-1 Obtain and combine	ESS3.C Human activities in	Visuals Small Group	Output: Make Judgements - Who

	130-131 Brain pop - Humans and the Environment National Geographic Reader - Power Up (Fossil Fuels) PSI Slides 39-48, 58 & 59	information about ways individual communities use science ideas to protect the Earth's resources and environment.	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)	Enrichment - (*Elaborate* section of Exploring Science teacher guide) research rainforest deforestation	has greater impact on land, people who live in suburbs with large yards and gardens or people who live in tall buildings in the cities?
Plants & Pollution	Exploring Science pg. 134-135 (Lab)	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Graphic Organizers Small Group Lab Sheets Enrichment - (*Elaborate* section of Exploring Science teacher guide) how might acidic chemicals affect plants?	Output: Lab Results
Humans Impact Water	Exploring Science pg. 136-137 PSI Slides 56 & 57, 73-81 Brain pop - Water Pollution	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Lab Sheets Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) research methods of	Output: Apply - List 3 ways you and your family use water every day. How could you reduce pollution in your everyday water use?

				irrigation	
Human Impact Air	Exploring Science pg. 138-139 National Geographic Reader - Power Up (Fossil Fuels) PSI Slides 50-55, 82-92 Brain pop - Air Pollution	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) *Power Up* Reader - choose a fossil fuel and describe how it formed	Output: Brainpop make a map / or movie depicting air pollution
Humans Impact Biosphere	PSI Slides 93-111	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group Enrichment - (*Elaborate* section of Exploring Science teacher guide) how humans affect biodiversity	Output: 3 negative effects humans have on species
Humans Impact Space	Exploring Science pg. 140-141	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Enrichment - (*Elaborate* section of Exploring Science teacher guide) why does most space junk fall in oceans?	Output: Why does much of the space junk that falls towards Earth never reach Earth's surface?

Protecting Land, Air, and Water	Exploring Science pg. 142-143 Science in a SNAP PSI Slides 112-129 Brain pop - Natural Resources	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Graphic Organizers Small Group Lab Sheets Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) how are plastics made, used, and recycled?	Output: Science in a SNAP recycling results
Think Like an Engineer Problem - How can people grow more trees in cities when there is no more space available?	Exploring Science pg. 144	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	ESS3.C 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) ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.	Visuals Graphic Organizers Small Group	Output: Engineer Solutions

			At whatever stage, communicating with peers about proposed ideas can lead to improved designs.		
Think Like an Engineer Solution - Design own vertical forest	Exploring Science pg. 146	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	ESS3.C 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) ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed ideas can lead to improved designs.	Visuals Graphic Organizers Small Group	Output: Forest Design
Renewable Energy Resources	Exploring Science pg. 148-149 National Geographic Reader - Power Up	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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	Visuals Small Group Enrichment - (*Elaborate* section of Exploring Science teacher guide) how are	Output: *Power Up* Reader - debate for or against wind farms

	(Renewable Energy Tour & Debating Wind Power) PSI Slides 130-143		communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	wind energy and hydroelectric energy alike? How do they differ?	
Using Solar Energy	Exploring Science pg. 150-151 (Lab) National Geographic Reader - Power Up (A Fuel of the Future) Brain pop - Conserving Energy	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	ESS3.C 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) ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	Visuals Graphic Organizers Small Group Lab Sheets Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) how could you apply this activity to people's need for water?	Output: Lab Results

Think Like a Scientist - In what ways do individual communities use science ideas to protect Earth's resources and the environment?	Exploring Science pg. 152-153	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Visuals Small Group	Output: Presentation about how to protect Earth's resources
Upcycling	Create something new out of trash/used materials	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model that can be improved.	ESS3.C 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) ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ETS1.B Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed ideas can	Visuals Small Group Enrichment - (*Elaborate* section of Exploring Science teacher guide) create shark tank script to sell your upcycling invention	Output: Upcycling Project (2-3 days)

			lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. ETS1.C Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.		
Unit Review	Study Guide	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Modified Study Guide	Guide
Unit Review	Study Guide	ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	ESS3.C 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)	Modified Study Guide	Guide

Materials Needed
● National Geographic Learning- Exploring Science ● National Geographic Learning website (www.myngconnect.com) ● Scientific Notebook

Interdisciplinary Connections	21st Century Themes & Skills (Life and Careers)
Earth's Resources - Language Arts (compare & contrast renewable & nonrenewable resources) Own Ecological Footprint - Language Arts (cause & effect) Lorax vs. Onceler Footprint - Language Arts (cause and effect / compare & contrast) Plants & Pollution Lab / Solar Energy Lab - Language Arts (cause & effect, sequencing, predictions, inferences) Engineer Solutions - Language Arts (cause & effect / problem & solution) Think Like an Engineer Design Vertical Forest - Math (measurement, scale, proportion) Think Like a Scientist - Language Arts & Writing (cause & effect / problem & solution)	*Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively** *Life & Career Skills:* **Initiative & Self-direction: Manage Goals & Time, Work Independently, Be Self-directed Learners** **Social & Cross-cultural Skills: Interact Effectively with Others** **Productivity & Accountability: Manage Products, Produce Results** **Leadership & Responsibility: Guide & Lead Others, Be Responsible**

SUBJECT: SCIENCE
GRADE LEVEL: 5
UNIT TITLE: MATTER
LENGTH OF STUDY: 24 DAYS
NUMBER OF LESSONS: 22 LESSONS

Unit Learning Goals

- Develop a model to describe that matter is made of particles too small to be seen.
  - 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)
- Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
  - The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
  - 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)
- Make observations and measurements to identify materials based on their properties.
  - Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)
- Conduct investigation to determine whether mixing two or more substances results in a new substance.

When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)

Lesson Topics	Instructional Activities	Performance Expectations	DCI	Modifications	Assessment/Benchmarks
What is Matter? - anything that has mass and takes up space	PSI Slides 4-16 Exploring Science pg. 4-5 National Geographic Reader - The Sinking of the Titanic (Building the Titanic)	PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	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. 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	Visuals Graphic Organizers Enrichment - (*Elaborate* section of Exploring Science teacher guide) if an	Output: MATTER Acrostic Poem

			observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)	astronaut is floating in space, does she have less mass than when standing on Earth?	
States of Matter - Solid / Liquid / Gas	Exploring Science pg.6-7 Mass of Air Lab - Empty and Blown up Balloon Study Jam - Solids/Liquids/Gases	PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	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. 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)	Visuals Lab Tables/Sheets Small Group Closed Caption Enrichment - (*Elaborate* section of Exploring Science teacher guide) is honey a solid, liquid, or gas?	Output: Examples of a substance in all 3 states
Think Like a Scientist - Develop a model to explain that matter is made of small particles too small to be seen	Exploring Science pg. 10-11	PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	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. 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)	Visuals Small Group	Output: Particle model (2 days)

Measuring Matter	PSI Slides 17-22 "Empty" Bottle Lab Brain pop - Measuring Matter	PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	PS1.A The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)	Visuals Lab Tables/Sheets Small Group Closed Caption Enrichment - How is mass different from or similar to weight?	Output: Lab observations & conclusions
Conservation of Mass	PSI Slides 23-27 Brain pop - Conservation of Mass	PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	PS1.A The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)	Visuals Closed Caption Enrichment - apply concept to heating and cooling	Output: Explain how matter is neither lost or destroyed
Observable Properties (Color, Shape & Size)	PSI Slides 32-40 Study Jams - Properties of Matter Observable vs. Measurable Properties Cut & Paste Exploring Science pg. 12-13	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Graphic Organizers Lab Tables/Sheets Small Group Closed Caption Enrichment - which properties involve an attraction or change?	Output: Choose an object in your surroundings. Describe its physical properties.
Oobleck Lab	Properties of Oobleck (slime)	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Graphic Organizers Lab Tables/Sheets	Output: Lab observations

				Small Group Closed Caption	
Properties of Matter - Hardness	PSI Slide 41 Lab Measuring Hardness - Science in a SNAP Exploring Science pg. 14-17	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Lab Tables/Sheets Small Group Closed Caption Enrichment - how hardness is used to manufacture objects in industry?	Output: Science in a SNAP conclusions
Properties of Matter - Magnetism	Lab Measuring Magnetism Exploring Science pg.18-19	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Lab Tables/Sheets Small Group Enrichment - advantage of using magnetism to lift and move train in picture? (pg. 18)	Output: Lab observations & conclusions
Properties of Matter - Electrical Conductivity	Bill Nye - Matter Exploring Science pg. 20-23	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Closed Caption Enrichment - why are electrical gloves made of rubber?	Output: examples of electrical conductors and insulators

Properties of Matter - Thermal Conductivity	Exploring Science pg. 24-25 Thermal Conductors mini lab	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Lab Tables/Sheets Small Group Enrichment - what is the relationship between thermal conductivity and thermal insulation?	Output: Conductor results
Properties of Matter	Mystery Object	PS1-3 Make observations and measurements to identify materials based on their properties.	PS1.A Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Small Group	Output: Property hints given for object
Properties of Matter - Solubility	PSI Slides 47-51 Salt Water Evaporation Lab (Exploring Science pg. 8 & 9) Exploring Science pg. 26-27 National Geographic Reader - The Sinking of the Titanic (Night the Titanic Sank)	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-3 Make observations and measurements to identify materials based on their properties.	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. 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) Measurements of a variety of properties can be used to identify materials. (5-PS1-3)	Visuals Graphic Organizers Lab Tables/Sheets Small Group Closed Caption Enrichment - how might temperature affect the rate at which salt dissolved in water?	Output: Make predictions for soluble/insoluble substances Lab Results

Solutions	PSI 52-60 Solutions Lab National Geographic - The World's Oceans (Our Salty Ocean)	PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. PS1-3 Make observations and measurements to identify materials based on their properties. ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model that can be improved.	PS1.A 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. (5-PS1-3) ETS1.C Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	Visuals Lab Tables/Sheets Small Group Enrichment - (*Elaborate* section of Exploring Science teacher guide) what do you think would happen if you did not stir the mixture?	Output: Lab observations & conclusions
Matter Changing State - Heating	PSI Slides 28-31 Brain pop - Matter Changing State (make-a-movie online activity) Lab - Observe & Measure Liquid Water Bottle vs. Frozen Water Bottle Exploring Science pg. 28-29	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	PS1.A The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)	Visuals Graphic Organizers Lab Tables/Sheets Small Group Closed Caption Enrichment - difference between melting and boiling point	Output: Lab observations & conclusions Brainpop movie
Matter Changing State - Cooling	Exploring Science pg. 30-33 Changing States Lab	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when	PS1.A The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) ETS1.C	Visuals Lab Tables/Sheets Small Group Enrichment - (*Elaborate*	Output: Lab Results

		heating, cooling, or mixing substances, the total weight of matter is conserved. ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model that can be improved.	Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	section of Exploring Science teacher guide) what experience have you had that supports the idea that exhaled air contains water vapor?	
Mixtures - how matter is conserved	Weigh baking soda and water separately then together Exploring Science pg. 34-35 National Geographic - The World's Ocean (Rainbow Beaches)	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	PS1.A The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)	Visuals Lab Tables/Sheets Small Group Enrichment - how is solution of baking soda in water different from mixture shown in blender? (pg. 35)	Output: Lab observations & conclusions
Chemical Changes & Reactions	Study Jams - Physical & Chemical Changes Exploring Science pg. 38-41	PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. PS1-4 Conduct investigation to determine whether mixing two or more substances results in a new substance.	PS1.B 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) When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)	Visuals Lab Tables/Sheets Small Group Closed Caption Enrichment - (*Elaborate* section in Exploring Science teacher	Output: Examples of physical vs. chemical changes with group

				guide) how can the new kinds of matter produced during a chemical reaction be harmful to people and environment?	
Chemical Changes & Reactions	Exploring Science pg.42-43 Alka-Seltzer Lab	PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. PS1-4 Conduct investigation to determine whether mixing two or more substances results in a new substance. ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model that can be improved.	PS1.B 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) When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) ETS1.C Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	Visuals Lab Tables/Sheets Small Group	Output: Results of Alka-Seltzer lab
Culminating Activity	Exploring Science pg. 44-45 Prepare Dinner	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	PS1.B 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) When two or more different substances are mixed, a new substance	Lab Tables/Sheets Small Group	Output: Describe properties of matter, heating, cooling, as well as chemical changes/reactions while

		PS1-3 Make observations and measurements to identify materials based on their properties. PS1-4 Conduct investigation to determine whether mixing two or more substances results in a new substance.	with different properties may be formed. (5-PS1-4)		creating meal (3 days)
Matter Review	STWS - Why Does Matter Matter? Matter Review Quiz	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. PS1-3 Make observations and measurements to identify materials based on their properties. PS1-4 Conduct investigation to determine whether mixing two or more substances results in a new substance.	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. 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. (5-PS1-3) PS1.B 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	Modified study guide	Quiz

			level.) (5-PS1-2) When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)		
Matter Test	Test	PS1-1 Develop a model to describe that matter is made of particles too small to be seen. PS1-2 Measure and graph quantities provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. PS1-3 Make observations and measurements to identify materials based on their properties. PS1-4 Conduct investigation to determine whether mixing two or more substances results in a new substance.	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. 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. (5-PS1-3) PS1.B 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) When two or more different substances are	Modified tests & accommodations (read aloud, etc.)	Test

			mixed, a new substance with different properties may be formed. (5-PS1-4)		

Materials Needed
www.myNGconnect.com National Geographic Learning Exploring Science Grade 5 Mass of Air Lab - latex free balloons, kale, flexible tape measures, string, tape, paper clips, scale Changing States Lab - empty water bottle, water bottle (liquid), water bottle (frozen ice), scale Oobleck Lab - 1 cup water, 1 ½ cups cornstarch, food coloring Hardness Lab - chalk, plastic spoon, crayon, rubber band, paper clip, mineral rocks Magnets Lab - nail, eraser, paper clip, coin, iron filings, aluminum foil Salt Water Evaporation Lab - black construction paper, salt, water, plastic cup, eye dropper Solution lab - sand, salt, oil, beakers, sugar, vegetable oil, lemon juice, plastic spoons Conservation of Mass - baking soda, water, zip lock bags, scale Changing States Lab - 2 resealable bags, tape, balance scale, water, graduated cylinder, gram masses Chemical Change Lab - zip lock bags, scale, water, Alka-Seltzer tablets

Interdisciplinary Connections	21st Century Themes and Skills (Life and Career)
Labs - Language / Writing (cause & effect relationships) Matter Acrostic Poem - Writing Matter Particles Model - Math (engineering) Empty Bottle Lab, Solubility Lab, Changing States Lab - Math (measuring / weighing objects) Preparing Dinner Activity - Writing	Think Creatively Work Creatively with Others Reason Effectively Use System Thinking Make Judgements and Decisions Communicate Clearly Collaborate with Others Apply Technology Effectively Be Flexible Work Independently Be Self-Directed Learners Work Effectively in Diverse Teams Manage Products Produce Results Guide & Lead Others *Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate with Others** *Information, Media, & Technology Skills -*

SUBJECT: Science
GRADE LEVEL: 5th
UNIT TITLE: Solar System
LENGTH OF STUDY: 23 Days
NUMBER OF LESSONS: 22 Lessons

Unit Learning Goals

- Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.
    - The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.
- Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
    - The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.
- Students will 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.
    - 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times.

Suggested Sequence of Lessons		Performance Expectations	Disciplinary Core Ideas	Modifications SE, ESL, & GT	Assessment/ Benchmarks
Gravity - gravitational pull towards center of Earth	PSI Slides 1-12 (abbreviated slides from forces unit shared in google drive) Brain pop - Gravity / Make a Map Exploring	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Visuals Graphic Organizers Closed Caption Enrichment - (*Elaborate* section from Exploring Science teacher guide) How gravity affects spacecraft	Output: Brain pop Make a Map to show how gravitational force is directed down toward center of the earth

	Science pg. 154-155				
Gravity - gravitational pull towards center of Earth applied to the moon	PSI Slides 13-19 Exploring Science pg. 156-157 - Gravity Lab National Geographic Reader - The Sinking of the Titanic (Alvin the Submersible)	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Lab Tables/Sheets Small Group Enrichment - (*Elaborate* section from Exploring Science teacher guide) Does the force of gravity stop when an object lands on the ground?	Output: Race to Bottom Lab Results
Gravity - attractive force between objects	PSI Slides 20-26 Acrostic Poem using Space Place - Gravity	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Visuals Graphic Organizers Enrichment - describe difference between gravity and the other 2 non-contact forces (magnetism & electric)	Output: Acrostic Poem Facts about GRAVITY explaining attraction between objects
Gravity - gravitational field & force vs distance	PSI Slides 27-34 Study Jams - Gravity & Inertia	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Visuals Closed Caption Enrichment - apply concept to astronauts on the moon	Output: how does size affect gravitational pull
Universe - galaxies	PSI Slides (Solar System	PS2-1 Students will support an	PS2.B The gravitational force of	Visuals Graphic Organizers	Output: Galaxy Sort

	Unit) 4-16 Study Jams - Universe Universe Flip Chart	argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Closed Caption	
Universe - galaxy where we live	Space Place - Gravity Facts, activities, galaxy pinwheel craft	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Visuals Small Group	Output: Pinwheel
Earth's Tilt	PSI Slides 38-48 Exploring Science pg. 158-159	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Visuals Enrichment - (*Elaborate* section from Exploring Science teacher guide) how does concept apply to leap years	Output: Illustration of Earth on its' tilt and how it rotates around the sun
Sun - appears bigger than rest of the stars	PSI Slides 17-29 Brain pop - Sun Exploring Science - pg. 160-161 Lab (Distance) - measure soccer ball on desk at arm's length, then step back 2 meters and measure again	ESS1-1 Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	ESS1.A The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	Visuals Graphic Organizers Closed Caption	Output: Results of Lab
Sun - labs to prove	PSI Slides 31-	ESS1-1	ESS1.A	Visuals	Output: Results of

brightness and distance	36 Add to Universe Flip Chart Exploring Science pg. 162-163 Lab (Brightness) - 3 penlights in dark 1m, 2m, 3m away	Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	Graphic Organizers Small Group Lab Tables/Sheets Enrichment - (*Elaborate* section from Exploring Science teacher guide)research stars	Lab
Sun - appears brighter than rest of the stars	Bill Nye - Sun UV Rays Craft - Space Place	ESS1-1 Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	ESS1.A The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	Visuals Closed Caption Enrichment - ozone hole	Output: what do our handprints prove about UV rays
Observable Patterns - Day & Night (daily change)	PSI Slides 49-54 Study Jams - A Day on Earth Exploring Science pg. 164-165 Science in a SNAP (flashlight & globe)	ESS1-1 Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth. ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Visuals Graphic Organizers Closed Caption Enrichment - how would length of day and night be affected if Earth's rotation were much slower?	Output: Conclusions of Science in a SNAP
Apparent Motion	PSI Slides 55-73 Exploring Science pg.	ESS1-2 Students will represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day	ESS1.B 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	Visuals Graphic Organizers Small Group Enrichment -	Output: Science in a SNAP conclusions

	166-167 Science in a SNAP	and night, and the seasonal appearance of some stars in the night sky.	and South poles, cause observable patterns. These include day and night; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	(*Elaborate* section from Exploring Science teacher guide) observe shadows made my landmarks	
Observable Patterns - Shadows	Shadow Lab Exploring Science pg. 168-169	ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Visuals Graphic Organizers Lab Sheets	Output: Shadow Lab Results
Observable Patterns - Seasons	PSI Slides 74-77 Brain pop - Seasons Exploring Science pg. 170-171	ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Visuals Closed Caption Enrichment - (*Elaborate* section from Exploring Science teacher guide) Compare & Contrast seasons	Output: Flow Chart showing Earth's revolution
Observable Patterns - Day & Night (daily change)	Exploring Science pg. 172-173 Numbers App - chart hours of	ESS1-2 Students will represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal	ESS1.B 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	Visuals Graphic Organizers Small Group Enrichment - (*Elaborate* section	Output: Hours of Daylight Chart

	daylight per month	appearance of some stars in the night sky.	observable patterns. These include day and night; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	from Exploring Science teacher guide) Find & graph daylight hours for Key West, FL vs Chicago, IL	
Observable Patterns - Constellations	PSI Slides 85-103 Brain pop - Constellations Create own constellation on black construction paper using chalk Exploring Science pg. 174-175	ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Visuals Closed Caption Enrichment - (*Elaborate* section from Exploring Science teacher guide) draw constellation that is visible in your area	Output: Own Constellation Cause & Effect - Why do some constellations seem to change during the year?
Think Like a Scientist - apply what you know about constellation Orion to other constellations	Exploring Science pg. 176-177	ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Small Group Enrichment - (*Elaborate* section from Exploring Science teacher guide) identify a constellation that is easily seen in the season you are currently experiencing	Output: Constellation data
Observable Patterns - Moon Phases	PSI Slides 78-84 Brain pop -	ESS1-2 Students will represent data in graphical displays to reveal patterns of daily	ESS1.B The orbits of Earth around the sun and of the moon around Earth, together with	Visuals Graphic Organizer Closed Caption	Output: Cut & Paste to show moon phases in order

	Moon Phases Moon Phases Cut & Paste Exploring Science pg. 178-181	changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Enrichment - moon phase monthly calendar	
Observable Patterns - Moon Phases	Exploring Science pg. 182-183 Moon Lab	ESS1-2 Students will 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.	ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Visuals Graphic Organizers Small Group Lab Tables/Sheets Enrichment - (*Elaborate* section from Exploring Science teacher guide) what would the moon look like over the period of a month to an observer in space?	Output: Results of Lab
Engineer Own Spacecraft / Satellite	Space Place website Create own Spacecraft using various materials	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center. ESS1-2 Students will 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. ETS1-1 Define a simple design	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. ESS1.B 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; changes in length and direction of shadows; different positions of the sun,	Visuals Lab Tables/Sheets Small Group Enrichment - how do we communicate with spacecraft's	Output: Spacecraft Model (2-3 days)

		problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	moon, and stars at different times of the day, month, and year. ETS1.A Possible solutions to a problem are limited by available materials and resources.		
Unit Review	Study Guide	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center. ESS1-1 Students will support an argument that differences in apparent brightness of the sun compared to other stars is due to their relative distances from Earth. ESS1-2 Students will 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.	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. ESS1.A The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.	Modified Study Guide	Guide
Unit Test	Test	PS2-1 Students will support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center. ESS1-1 Students will support an argument that differences in apparent brightness of the sun compared to other stars	PS2.B The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. ESS1.A The sun appears larger and brighter than other stars because it is closer. Stars range greatly in their	Modified Test Read aloud	Test

		is due to their relative distances from Earth. ESS1-2 Students will 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.	distance from Earth. ESS1.B 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; changes in length and direction of shadows; different positions of the sun, moon, and stars at different times of the day, month, and year.		

Materials Needed
Gravity Lab - paper, crumpled paper, pencil, eraser, coin, ball Galaxy Pinwheel - galaxy printout, pipe cleaner, popsicle stick, hole puncher, scissors UV Rays Craft - construction paper, sunscreen Sun Distance Lab - ruler, meter stick, soccer ball Sun Brightness Lab - 3 penlights Moon Phases Lab - lamp, Styrofoam ball, craft stick Constellations Craft - black construction paper & chalk

Interdisciplinary Connections	21st Century Themes & Skills (Life and Careers)
Distance Lab - Math (using tools to measure objects in order to reach lab result) Pinwheel & Spacecraft Model - Math (engineering) Gravity Lab & Brightness Lab - Writing (lab results and conclusions) Gravity Acrostic Poem - Writing	*Key Subjects & 21st Century Themes -* **Environmental Literacy** *Learning & Innovation Skills -* **Creativity & Innovation: Think Creatively, Work Creatively with Others, Implement Innovations** **Critical Thinking & Problem Solving: Reason Effectively, Use Systems Thinking, Make Judgements & Decisions, Solve Problems** **Communication and Collaboration: Communicate Clearly, Collaborate**

Moon Phases - Math (calendar) Shadow Lab - Math (measurement & angles) Seasons / Earth's Tilt - Math (measuring time & angles)	**with Others** *Information, Media, & Technology Skills -* **Information Literacy: Access and Evaluate Information, Use and Manage Information** **Media Literacy: Analyze Media** **ICT: Apply Technology Effectively** *Life & Career Skills:* **Initiative & Self-direction: Manage Goals & Time, Work Independently, Be Self-directed Learners** **Social & Cross-cultural Skills: Interact Effectively with Others** **Productivity & Accountability: Manage Products, Produce Results** **Leadership & Responsibility: Guide & Lead Others, Be Responsible**