ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

SCIENCE

6th Grade Integrated Science

Board of Education

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BOARD OF EDUCATION INITIAL ADOPTION DATE:

Course Philosophy

Science and science education are essential to the lives of everyone. By learning science, students become informed and involved citizens as well as innovative thinkers. This course is structured around The Next Generation Science Standards (NGSS), where students apply their knowledge and skills to master these new science standards. The NGSS embodies a new vision for how students learn science by combining core ideas with cross-cutting concepts and science and engineering practices. They emphasize the practice of scientific inquiry and analysis, and provide students with a variety of interactions that shift the cognitive expectation from simple answers to higher-level, critical-thought responses. Explicit strategies guide the learner while hands-on investigations focus on open-ended inquiry. By introducing students to new concepts with phenomena, students actively discover the knowledge and skills required to solve real-world problems. This course strives to educate students in science and engineering in order to prepare them for today's technologically advanced world.

Course Description

The 6th grade integrated science program is structured and based on the Next Generation Science Standards. Integrated science is a revolutionary science program that provides students with science topics that span many scientific disciplines. This course integrates multiple disciplines to enable students to make relevant connections and generate meaningful associations with the real world. By integrating crucial critical thinking skills, students enhance content and skills in all disciplines. This course helps students think about, read about, write about, and talk about science. It elevates thinking and learning by engaging students with phenomena, and with problem-based activities to anchor each topic. Students will connect science, technology, engineering, and mathematics with STEM activities that fuel innovation, problem solving, collaboration, and reasoning—skills needed for future careers. This blended print and digital curriculum prepares students for the challenges of tomorrow.

Core Materials	Supplemental Materials
• <u>Elevate Science Course 1</u> by Pearson Education	 Teacher created resources Various internet activities TedED Brain POP National Geographic IXL Newsela EdPuzzle Kesler Station labs Khan Academy Crash Course PBS Digital Learning https://whyy.pbslearningmedia.org/ https://www.ck12.org/teacher/ https://sciencespot.net/

Core and Supplemental Instructional Materials

Social Emotional Learning Connections

Below are the five core SEL Competencies as outlined by CASEL, and examples of how each may be addressed within this curriculum

Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.

Example 1: Students will reflect on their learning at the end of class by using an exit slip to gauge their understanding of the day's lesson. Encourage student self-reflection on things they have learned, things they need to work on, and goals they need to set.

Example 2: Students will use journal writings about their observations about their communities and the world they live in. By practicing reflective writing every day, this can help students learn to consider their thoughts and feelings in a self-aware way.

Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.

Example 1: Incorporate stress management techniques in the classroom (e.g., deep breathing, stretching, yoga movements, and affirmations), and identify appropriate settings for each of these strategies.

Example 2: Students will reflect on their learning by completing self-reflection checklists and reflecting on their progress and skills after assessments and projects. This will also give students a chance to discuss how teams are working together and whether everyone is getting their chance to take part.

Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.

Example 1: When learning about minerals, students will learn about the harsh conditions that miners face while mining minerals found in cell phones in Africa, South America and China.

Example 2: Students will share opinions on engineer designs to show how glaciers, rivers, and Earth's natural processes change the land; Students

will understand perspectives of others and empathize with others when presenting erosion models to classmates.

Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.

Example 1: Have students perform different roles in cooperative learning groups (i.e., leader, recorder, reporter, time-keeper) to develop and practice communication skills.

Example 2: In order to resolve an issue in a relationship, teach students how to calmly discuss the problem, brainstorm solutions, and come to an appropriate decision.

Responsible decision-making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.

Example 1: Encourage students to use their listening skills and be open minded to other opinions. Let students share their views on current events or relevant topics such as the impact of social media on our well-being.

Example 2: Give students a range of options for completing and submitting assignments. For example, the QUEST projects can be done in a format of their choice, such as giving a class presentation, creating a video, or building a website.

Integration of 21st Century Themes and Skills

N	NJSLS-CLKS 9.4: Life Literacies and Key Skills				
Creativity and Innovation	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
	Can be found in unit: 2, 4, 6, 8				
Children 1 This 1 in a search Desching Calling	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
Critical Thinking and Problem Solving	Can be found in unit: 1, 3, 7, 10				
Digital Citizenship	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
	Can be found in unit: 5, 6				
Global and Cultural Awareness	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
	Can be found in unit: N/A				
Information and Media Literacy	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
	Can be found in unit: 3, 6, 8				
Technology Literacy	See specific standards and their connections/examples for this disciplinary concept listed within each individual unit				
	Can be found in unit: 9, 10				

Robbinsville Ready 21st Century Skill Integration

The following skills will be embedded throughout the curriculum and instruction of this course.

Collaborative Team Member: Robbinsville students will learn more by working together than in isolation. As educational theorist Lev Vygotsky advocated, learning is a social process. Many workplaces today encourage employees to work in teams to solicit diverse perspectives, brainstorm new ideas and/or products, and solve problems. Further, collaboration fosters interpersonal relationships, self-management skills, cooperation, and a sense of collective responsibility. Collaborative team members are able to work with diverse groups of people who hold a variety of perspectives.

Effective Communicator: Robbinsville students must be able to clearly articulate their ideas orally, in writing, and across various media in order to successfully connect to the world around them. As the world becomes increasingly globalized, communication is more than just sharing one's ideas. Effective communicators are able to communicate their convictions, actively listen and analyze others' work to identify perspective and/or potential bias.

Emotionally Intelligent Learner: Robbinsville students who are emotionally intelligent learn to be empathetic, demonstrate integrity and ethical behavior, are kind, are self-aware, willing to change, and practice self-care. They are better able to cope with the demands of the 21st century digital society and workplace because they are reliable, responsible, form stable and healthy relationships, and seek to grow personally and professionally. Emotionally intelligent people are able to manage their emotions, work effectively on teams and are leaders who can grow and help to develop others.

Informed and Involved Citizen: Robbinsville students need to be digital citizens who are civically and globally aware. The concept of what it means to be "literate" has evolved along with 21st century technological and cultural shifts. Our progressive vision of literacy entails having our students explore real world problems in the classroom. Informed and involved citizens are able to safely and accurately communicate with people all around the world and are financially, environmentally and informationally literate.

Innovative Thinker: Robbinsville students must encompass innovative thinking skills in order to be successful lifelong learners in the 21st century world. As stated by Karl Fisch and Scott McLeod in the short film Shift Happens, "We are currently preparing students for jobs that don't yet exist . . . using technologies that haven't been invented . . . in order to solve problems we don't even know are problems yet." Innovative thinkers are able to think analytically, solve problems critically, creatively engage in curiosity and tinkering, and demonstrate originality.

Resilient and Self-Directed Learner: Robbinsville students need to take risks and ultimately make independent and informed decisions in an ever-changing world. Author of Life, the Truth, and Being Free, Steve Maraboli stated, "Life doesn't get easier or more forgiving, we get stronger and more resilient." Self-directed scholars of the 21st century are able to set goals, initiate resolutions by seeking creative approaches, and adjust their thinking in light of difficult situations. Resilient students are able to take risks without fear of failure and overcome setbacks by utilizing experiences to confront new challenges. Resilient and self directed scholars will consistently embrace opportunities to initiate solutions and overcome obstacles.

Career Awareness and Planning Standards 9.2			
9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.	Example: Students learn about different STEM careers that incorporate science and technology skills that are learned in the curriculum. Have students research careers of interest and discuss with the class.		
9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market.	Example : Students will research how STEM jobs can be affected by the economy, as well as social and political conflicts (ex: cloning, space travel,etc) about moral and ethical concerns that can affect their specific career path.		
9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.	Example: Incorporate reflection and exploration about student interests in science topics based on their own talents and strengths. Students journal about all the careers covered in the curriculum and then research one that interests them. They then share their findings with each other in small groups and post them on the wall or the class website.		

Robbinsville Public Schools Scope, Sequence, Pacing and Assessment

6th Grade Science

Unit Title	Unit Understandings and Goals	Recommended Duration/ Pacing	Assessments
Unit 1: Introduction of Matter	How do scientists classify matter? Is it based on its physical properties? Measurable properties? Ability to change state or change form? Students learn that all of these concepts apply when identifying matter. They are important to know so that proper materials are combined (or not combined). They also lead to advancements in technology such as superconductivity and the maglev train.	3 Weeks (Approximately 13 days)	Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course) Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How can you use science to make special effects?" Performance- Based Assessment "Help Out with the Wildlife"
Unit 2: Solids, Liquids, and Gases	In this topic, students examine solids, liquids, and gases based on their physical properties. This includes their reactions to temperature changes, and their relationship to pressure and volume at the particle level.	3 Weeks (Approximately 15 days)	Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback

			Open-ended/ scaffolded questions
			Summative · Lesson checks · Lesson quiz · Unit assessment · QUEST project rubric · Teacher feedback and comments Common Benchmark Assessments (mid/end of course) · Content SGO · Skills SGO Alternative Assessments (projects, etc when appropriate)
			 QUEST project "How can you use solids, liquids and gases to lift a car?"
			Performance- Based Assessment "Melting Ice"
Unit 3: Energy	Energy is around us all day, every day. We use energy in all facets of our lives, whether we are sleeping, talking, cooking, or simply reading a book. With this topic, students learn the nature and role of energy in the world and apply concepts related to kinetic and potential energy to demonstrate how energy is transferred and transformed. Students use this information to trace energy through a system, understand where energy comes from, how and why energy is used, and make informed decisions about the role of energy to accomplish a specific task.	3-4 Weeks (Approximately 19 days)	Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course) Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How can you build a complicated machine to do something simple?"
Unit 4: Thermal Energy	Thermal energy and heat transfer are important concepts in many real-world situations, such as melting metals for industrial use, cooking and baking, and fashioning outerwear for specific purposes. While investigating energy transformations, students analyze the relationships	3 Weeks (Approximately 14 days)	 Performance- Based Assessment "3, 2, 1 Liftoff" Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback

	among thermal energy, temperature, transfer of		· Open-ended/ scaffolded questions
	heat energy, and changes in states of matter.		Summative · Lesson checks · Lesson quiz · Unit assessment · QUEST project rubric · Teacher feedback and comments Common Benchmark Assessments (mid/end of course) · Content SGO · Skills SGO Alternative Assessments (projects, etc when appropriate) · QUEST project "How can you keep hot water from
			 cooling down?" Performance- Based Assessment "Testing Thermal Conductivity"
Unit 5: Introduction to Earth's Systems	In this topic, students explore Earth's systems. While studying Earth's systems, students will recognize the importance of understanding the interactions between Earth's systems and how those systems affect each other.	3+ Weeks (Approximately 16 days)	Formative • Interactivities • Hands-on investigative labs • Virtual labs • Enrichment activities • QUEST project check-ins • Teacher and peer feedback • Open-ended/ scaffolded questions Summative • Lesson checks • Lesson quiz • Unit assessment • QUEST project rubric • Teacher feedback and comments Common Benchmark Assessments (mid/end of course) • Content SGO • Skills SGO Alternative Assessments (projects, etc when appropriate) • QUEST project - How can you predict the effects of a forest fire? • Performance- Based Assessment "Modeling a Watershed"
Unit 6: Weather in the Atmosphere	The impact of weather and climate on severe storms is the context of this topic. While studying water in the atmosphere and the interactions between air masses, students recognize the direct relationship between weather and climate.	4-5 Weeks (Approximately 23 days)	Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities

			 QUEST project check-ins Teacher and peer feedback Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course) Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How can you prepare for severe weather?" Performance- Based Assessment "Water From Trees"
Unit 7: Mineral and Rocks in the Geosphere	Earth's processes are at the center of this topic. Students learn the processes by which rocks and minerals form and how they are recycled as a result of energy flow.	4 Weeks (Approximately 19 days)	Formative Interactivities Hands-on investigative labs Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course) Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How can you depict Earth Processes in a Movie Script?" Performance- Based Assessment "The Rock Cycle in Action"
Unit 8: Plate Tectonics	Throughout this topic, students evaluate evidence of plate motion and the continued impact of plate	4 Weeks (Approximately 19	Formative Interactivities
	rectorites on martins surface. Students recognize the	uaysj	1 Tanus-On investigative fabs

Unit 9: Earth's Surface Systems	relationship between plate boundaries and the resulting changes to Earth's surface over varying time scales.	4 Weeks (Approximately 20 days)	 Virtual labs Enrichment activities QUEST project check-ins Teacher and peer feedback Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course) Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How safe is it to hike around Mount Rainier?" Performance- Based Assessment: "Modeling Sea-Floor Spreading" Formative Interactivities Hands-on investigative labs Virtual labs
			 Open-ended/ scaffolded questions Summative Lesson checks Lesson quiz Unit assessment QUEST project rubric Teacher feedback and comments Common Benchmark Assessments (mid/end of course)
			 Content SGO Skills SGO Alternative Assessments (projects, etc when appropriate) QUEST project "How can I design and build an artificial island?" Performance- Based Assessment "Materials on a Slope"
Unit 10: Living Things in the Biosphere	In this topic, students will explore living things, including how and why organisms are classified.	4 Weeks	Formative • Interactivities

Students will also learn about viruses, bacteria, protists, fungi, plants and animals and how	(Approximately 20 days)	 Hands-on investigative labs Virtual labs 	
organisms from these various groups impact		Enrichment activities	
humans.		 QUEST project check-ins 	
		· Teacher and peer feedback	
		Open-ended/ scaffolded questions	
		Summative	
		Lesson checks	
		· Lesson quiz	
		• Unit assessment	
		QUEST project rubric	
		Teacher feedback and comments	
		Common Benchmark Assessments (mid/end of course)	
		· Content SGO	
		· Skills SGO	
		Alternative Assessments (projects, etc when appropriate)	
		· QUEST project "How can you design a field guide to	
		organize living things?"	
		· Performance- Based Assessment "It's Alive!"	

Unit #1: Introduction to Matter

Enduring Understandings:	Essential Questions:			
 Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those 	 How can we observe, measure, and use matter? How do particles combine to form a variety of matter? How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them? 			
of the reactants. Interdisciplinary Connections				

NJSLS Mathematics 6.G.A.2 Apply the formula V = hwh and V = bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

• Example: Students will calculate the volume of a regular object and irregular object using water displacement.

NJSLS Mathematics 6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$, and the use rate language in the context of a ratio.

• Example: Students will apply reasoning skills by identifying the ratio of hydrogen and oxygen atoms before and after a reaction.

Career/Real World Connections

Careers

- Chemists study the composition of matter and its properties. Chemists carefully describe the properties they study in terms of quantities, with detail on the level of molecules and their component atoms.
- Art conservation Over time, art can fade, decay, or get dirty. Conservation scientists find ways to restore art by examining its properties. They look at texture, color, and age of the paint, the condition of the canvas, and the materials used to make the paint. Then the scientists can determine the chemical properties of the painting.

Real World Connections

• Special Effects - Movie directors and producers have been dazzling audiences with their special effects since people started making movies. Early movies used miniature models of people, places and things to create realistic settings and images when using the actual place or object was impossible. Later, matte paintings, robots and make-up were used to trick audiences.

• Surface tension - The cohesive forces between liquid molecules are responsible for the phenomenon known as surface tension. The molecules at the surface of a glass of water do not have other water molecules on all sides of them and consequently they cohere more strongly to those directly associated with them. The stronger cohesion between the water molecules as opposed to the attraction of the water molecules to the air makes it more difficult to move an object through the surface than to move it when it is completely submersed.

Guiding / Topical Questions with Specific Standards		Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	What is matter made of?	Students compare the physical and chemical	Phenomena:	Elevate Interactivities:	Open-ended quiz
PS1-1		properties of matter and model the arrangement	- Water freezing instantly in very	- What Makes Up	1 1
	What properties describe	of atoms. They also compare homogeneous and	cold air temperatures	Matter?	Think Pair Share
MS-	matter?	heterogeneous mixtures.	- Why does cutting an onion make	- Molecules and	
PS1-2			you cry?	Extended	Four corners
	How can you classify	Students measure weight, mass, colume, and	https://thewonderofscience.com/	Structures	
9.4.8.	different types of matter?	density as physical properties of after. They	phenomenon/2018/7/12/why-doe	- Calculating Density	Science notebooks
CT.2	~1	also investigate how measurement can	s-cutting-an-onion-make-you-cry	- Weight on the	
	How can matter be	determine properties of matter.	- Aerogels- World's Lightest Solids	Moon	Discussions/socratic
	measured?		https://thewonderofscience.com/	- Properties of	seminars
		Students investigate how atoms rearrange	phenomenon/2018/7/9/aerogels-	Matter	
	What properties of matter	during a chemical change. They also use text to	worlds-lightest-solids		Graphic Organizers
	can be determined	support the idea that energy and matter are	- Burning Steel Wool	Hands-On Labs:	
	through measurement?	related.	https://thewonderofscience.com/	- The Nuts and Bolts	Individual whiteboards
			phenomenon/2018/7/8/burning-s	of Formulas	
	How are changes in matter	CCC.3 Scale. Proportion and Quantity	teel-wool	- Modeling Atoms	Lab reports
	related to changes in	Students will create models of various scales	- Indestructable Coating- Polyurea	and Molecules	*
	energy?	that can be used to study phenomena such as	https://thewonderofscience.com/	- Observing Physical	open-ended
		atoms and molecules which are too small to	phenomenon/2018/7/9/indestruc	Properties	questioning
	What is the difference	observe.	tible-coating-polyurea	- Physical and	
	between a physical change		- Elephant Toothpaste	Chemical Changes	Self assessments
	and a chemical change?	CCC.5 Energy and Matter	https://thewonderofscience.com/	- Is a New Substance	
		Students will describe the physical difference	phenomenon/2018/5/13/elephant	Formed?	Peer assessments
		between rainwater and ice crystals such as snow.	-toothpaste		
			- Milk and soap experiment		Show of hands/3-2-1
		CCC.1 Patterns	https://thewonderofscience.com/		
		Students will identify patterns in atomic-level	phenomenon/2018/7/11/milk-an		Exit slips
		structure related to a substance's visible	d-soap-experiment		
		macroscopic structure.	- Slime		Project rubrics
			https://thewonderofscience.com/		
		Key terms:	phenomenon/2018/5/13/slime		Lesson quizzes and
		- matter	- Water hat		unit test
		- substance	https://www.ngssphenomena.com		
		- physical property	<u>/#/water-hat/</u>		Lesson checks

	- chemical property		
	- atom	SEP.2 Developing and Using	Reading checks
	- element	Models	
	- molecule	Develop models to describe the	QUEST project "How
	- compound	atomic composition of simple	can you use science to
	- mixture	molecules and extended structures.	make special effects?"
	- mass		
	- volume	SEP.4 Analyzing and Interpreting	Performance-Based
	- weight	Data	Assessment "Help Out
	- density	Analyze and interpret data on the	with the Wildlife" -
	- physical change	properties of substances before and	Students will design a
	- chemical change	after the substances interact to	procedure to remove
		determine if a chemical reaction has	the salt, sand, and iron
		occurred.	filings from a nearby
		Handa On Laba	pond after a nurricane.
		Hands-On Labs	
		Virtual Labs	
		Online webquests	
		1	
		Topic Enrichments	
		•	
		Graphic Organizers	
		Scientific arguments (CER)	
		Science Videos	
		Science Stations	
		Internative Science Iovernals	
		interactive science journais	
		Digital Learning	

Unit #2: Solids, Liquids, and Gases

Enduring Understandings:	Essential Questions:				
• Gases and liquids are made of molecules or inert atoms that are moving	• What causes matter to change from one state to another?				
about relative to each other.	• How do particles combine to form the variety of matter observed?				
• In a liquid, the molecules are constantly in contact with others; in a gas,					
they are widely spaced except when they happen to collide. In a solid,					
atoms are closely spaced and may vibrate in position but do not change					
relative locations.					
• The changes of state that occur with variations in temperature or pressure					
can be described and predicted using these models of matter.					
Interdisciplinary	Interdisciplinary Connections				

NJSLS Mathematics 7.RP.2.c Represent proportional relationships by equations.

• Example: Students will determine the unknown variable with the ideal gas law, PV = nRT

NJSLS Mathematics 8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.

• Example: Students plot points to graphically illustrate Charles's Law with *degree Kelvin* along the x-axis and *mL* along the y-axis.

Career/Real World Connections

Careers

- Structural engineers Solids tend to expand when heated and contract when cooled. Because of this, engineers include metal expansion joints in their designs.
- Condensed matter physicists study the physical properties of condensed phases of matter, such as liquids and solids. They study phenomena ranging from superconductivity to liquid crystals.
- Plasma physicists study plasmas, which are considered a distinct state of matter and occur naturally in stars and interplanetary space and artificially in neon signs and plasma screen televisions. Many plasma physicists study ways to create possible fusion reactors that might be a future source of energy.

- Hydraulics systems convert pressurized oil into mechanical energy, making them more efficient than other types of motors. Hydraulic pumps move fluid through the system while valves control the flow. Filtration systems keep fluid clean and remove water and air from hydraulic fluid. Seals keep fluid in and contaminants out to ensure the system runs efficiently. Hydraulic motors convert hydraulic energy to rotary energy for powering lifts, fans, and other equipment.
- Strengthening metals for jewelry jewelers add other metals to silver and gold because these metals tend to be too soft for jewelry on their own. Sterling silver is 92.5% silver mixed with mostly copper, and gold is mixed with silver and copper to make it stronger and less expensive.

- Double boiler Recipes requiring melted chocolate often suggest melting the chocolate in a double boiler. A double boiler is made with a pan set over another pan. Water is placed in the bottom pan and is brought to a boil. Chocolate is placed in the top pan and is heated more slowly than it would in a pan directly on the stove.
- Cryosurgery generally uses liquid nitrogen to freeze unwanted, harmful cells. At room temperature, nitrogen is a colorless, odorless gas. However, when it undergoes extreme cold, it condenses into a liquid (around -200 degrees Celsius). At this temperature, it instantly freezes anything it touches, and can destroy cells upon contact.
- Many sports use inflated balls, including basketball, football, and soccer. In regulation play, the balls must be inflated to a specific pressure. In the United States, the unit for pressure is pounds per square inch, or psi. Rules about ball inflation allow small variations in pressure.

Guidi wit	ng / Topical Questions th Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	What are the similarities	Students analyze and develop models to explain	Phenomena:	Elevate Interactivities:	Open-ended quiz
PS1-4	and differences between	how particle arrangement and behavior define	- Aerogels	- Properties of	
	solids, liquids, and gases?	each of the three states of matter.	- https://thewonderofscience.com/	Solids, liquids and	Think Pair Share
9.4.8.	What is the relationship		phenomenon/2018/7/9/aerogels-	gases	
CI.2	between particle motion	Students use scientific reasoning to determine	worlds-lightest-solids	- Particles and states	Four corners
	and state of matter?	the effects of thermal energy and pressure on	- Reusable heat packs	of matter	
	How does thermal energy	matter at the particle level.	https://thewonderofscience.com/	- A Matter of	Science notebooks
	play a role in particle		phenomenon/2018/7/8/reusable-	Printing	
	motion and changes of	Students examine the relationship between	heat-packs	- Determining the	Discussions/socratic
	state?	temperature, pressure, and volume as they apply	- Supercooled water	State of Matter	seminars
	What happens to particles	to particle behavior of gases.	https://thewonderofscience.com/	- States of Matter	
	during changes of state		phenomenon/2018/7/9/supercool	- Changing States	Graphic Organizers
	between solids, liquids, and	CCC.1 Patterns	ed-water	- Thermal Energy	
	gases?	Students use observations from experiments	- The collapsing Train Car	and Changes of	Individual whiteboards
	How does pressure affect	with solids, liquids and gases to explain each	https://thewonderofscience.com/	State	
	the change of state from	state of matter.	phenomenon/2018/6/10/the-colla	- Gas Laws	Lab reports
	liquid to gas?		psing-train-car	- A Hot-Air Balloon	
		CCC.2 Cause and Effect	- Rising bread (Charles's Law in the	Ride	open-ended
	How do changes in	Students will describe cause-and effect	Oven)		questioning
	particle motion of a gas	relationships related to the role thermal energy		<u>Hands-On Labs:</u>	
	affect physical properties?	plays in particle motion and changes in state.	SEP.2 Developing and Using	- Solid, liquid or Gas	Self assessments
	How are the temperature,		Models	- Properties of	
	pressure, and volume of a	CCC.7 Stability and Change	Develop a model that predicts and	Matter	Peer assessments
	gas related?	Students identify how candles melt and harden,	describes changes in particle motion,	- Mirror, Mirror	
		and identify which processes must occur for	temperature, and state of a pure	- How Can Air Keep	Show of hands/3-2-1
		objects to melt or harden.	substance when thermal energy is	Chalk From	
			added or removed.	Breaking?	Exit slips
		Key terms:			

	- solid	SEP.6 Constructing Explanations	- Testing Charles's	Project rubrics
	- liquid	and Designing Solutions	and Boyle's Laws	
	- surface tension	Predict how particle motion plays a	- Phases of Matter	Lesson quizzes and
	- viscosity	part in ice-skating.		unit test
	- gas		CER: What effect does	
	- thermal energy	Discuss observations of what happens	the amount of thermal	Lesson checks
	- temperature	to air-filled objects after they are left	energy have on water?	
	- melting point	out in the sun and when they are left		Reading checks
	- freezing point	out in the cold.	States of Matter	
	- vaporization		https://www.nasa.gov/	QUEST project "How
	- billing point	Hands-On Labs	pdf/544895main_PS3_	can you use solids,
	- evaporation		States of Matter C1.p	liquids and gases to lift
	- condensation	Virtual Labs	<u>df</u>	a car?"
	- sublimation			
	- pressure	Online webquests	Middle School	Performance-Based
	- Boyle's Law		Chemistry	Assessment "Melting
	- Charles's Law	Topic Enrichments	https://www.middlesc	Ice" - Students
			hoolchemistry.com/les	investigate and
		Graphic Organizers	<u>sonplans/chapter1</u>	compare the melting
				rates of ice water at
		Scientific arguments (CER)	PBS videos and lessons	two different
			on states of matter	temperatures.
		Science Videos	https://nj.pbslearning	
			media.org/subjects/sci	
		Science Stations	ence/physical-science/	
			matter-and-interactions	
		Interactive Science Journals	<u>/states-of-matter/</u>	
		Digital Learning	States of Matter	
			simulations	
			https://phet.colorado.e	
			<u>du/en/contributions/v</u>	
			<u>iew/3195</u>	

Unit #3: Energy

Enduring Understandings:	Essential Questions:				
• A system of objects may also contain stored (potential) energy, depending	• What is meant by conservation of energy?				
on their relative positions.	 How is energy transferred between objects or systems? 				
• When two objects interact, each one exerts a force on the other that can	 How does energy cause change? 				
cause energy to be transferred to or from the object.	 How are forces related to energy? 				
• Temperature is a measure of the average kinetic energy of particles of	 How do food and fuel provide energy? 				
matter. The relationship between the temperature and the total energy of					
a system depends on the types, states, and amounts of matter present.					
• The chemical reaction by which plants produce complex food molecules					
(sugars) requires an energy input to occur. In this reaction, carbon					
dioxide and water combine to form carbon-based organic molecules and					
release oxygen.					
• Motion energy is properly called kinetic energy; it is proportional to the					
mass of the moving object and grows with the square of its speed.					
• When the motion energy of an object changes, there is inevitably some					
other change in energy at the same time.					
Interdisciplinary	Connections				

incruiscipinary connections

NJSLS Mathematics 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Example: Students will use the equation for work to determine the value of the variables: work, force and distance (work is calculated by multiplying the ٠ force by the amount of movement of an object (W = F * d).

NJSLS Mathematics 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Example: Students will use a data table showing the numbers of the Colorado Rockies' home runs at home and away. They will use this data to determine ۲ the ratio of home runs hit at home vs. away.

Career/Real World Connections

Careers

Energy engineers make the world more energy efficient by carrying out a wide range of work that involves research, design, and construction. Some energy ٠ engineers explore new methods of obtaining energy, while others develop ways to integrate renewable energy sources into the existing power grid. They also work with architects to incorporate clean energy sources in new construction.

- The Domino Effect When a domino falls, much of its potential energy is converted to kinetic energy, or energy of motion. Falling dominoes slide against one another, and their bottoms slip against the surface they're on. Both movements create friction. As a result, some energy is converted into heat and sound.
- Throughout history, humans have developed several devices to make work easier. The most notable of these are known as the "six simple machines": the wheel and axle, the lever, the inclined plane, the pulley, the screw, and the wedge. Because work is defined as force acting on an object in the direction of motion, a machine makes work easier to perform by accomplishing one or more of the following functions: transferring a force from one place to another, changing the direction of a force, increasing the magnitude of a force, or increasing the distance or speed of a force. Simple machines are devices with no, or very few, moving parts that make work easier. Many of today's complex tools are just combinations or more complicated forms of the six simple machines
- Gravitational forces (or G-forces) refer to the kinetic energy of an object compared to the force of gravity, which is 9.8 meters per second. Gravitational potential energy represents the potential an object has to do work as a result of being located at a particular position in a gravitational field.
- Rockets require an enormous amount of energy in order to escape Earth's gravitational pull. Rockets use the potential energy in special fuels to launch. This fuel is ignited, transforming the potential energy into chemical energy The chemical energy is converted into mechanical energy in the form of kinetic energy as the rocket lifts off and expels exhaust, and as thermal energy as the rocket gives off heat.

Guidi wit	ng / Topical Questions h Specific Standards	ons s Content, Themes, Concepts, and Skills Teaching Strategies Instructional Resources and Materials		Assessment Strategies	
MS-	How is energy related to	Students use text evidence and	Phenomena:	Elevate Interactivities:	Open-ended quiz
PS3-1	motion and force?	mathematical models to define energy,	- Rube Goldberg machines	- Things That Have Energy	
		motion, force, and work and to determine	https://thewonderofscience.c	- Understanding Machines	Think Pair Share
MS-	What are the relationships	their relationships.	om/phenomenon/2018/7/8/	- Levers	
PS3-2	among energy, motion,		<u>amazing-rube-goldberg-machi</u>	- Get the Ball Rolling	Four corners
	force and work?	Students model the relationship between	nes	- Force and Energy	
MS-		kinetic and potential energy.	- The Gravity Light	- Applying Energy	Science notebooks
PS3-3	What determines an		https://thewonderofscience.c	- Interpret Kinetic Energy	
	object's kinetic energy?	Students use scientific evidence to	om/phenomenon/2018/7/9/	Graphs	Discussions/socratic
MS-		identify and relate different forms of	the-gravity-light	- Racing for Kinetic Energy	seminars
PS3-4	What factors affect	energy.	- Magnetic Cannon	- Roller Coasters and Potential	
	potential energy?		https://thewonderofscience.c	Energy	Graphic Organizers
MS-		Students model proportional	om/phenomenon/2017/10/8	- Types of Energy	
PS3-5	What is the relationship	relationships to explain that energy is	/ps2-motion-and-stability-for	- Forms of Energy	Individual whiteboards
	between potential and	neither created nor destroyed?	ces-and-interactions	- Everyday Energy	
9.4.8.	kinetic energy?		- Pendulums	Transformations	Lab reports
CT.3		CCC.2 Cause and Effect	https://thewonderofscience.c	- Take It to the Extreme	
	How can different forms	Students explain how energy and force	om/msps35#phenomena		open-ended
9.4.8.	of energy be classified,	cause power, motion and work.	- Newton's Cradel	<u>Hands-On Labs:</u>	questioning
IML.3	quantified, and measured?		https://thewonderofscience.c	- What Would Make a Card	
				Jump?	Self assessments

How are different forms	CCC.3 Scale, Proportion and Quantity	om/phenomenon/2018/4/30	- What Work Is	
of energy related to each	Students will integrate quantitative	/giant-newtons-cradle	- Mass, Velocity, and Kinetic	Peer assessments
other?	information to explain the relationship	- Drinking Bird	Energy	
	between potential and kinetic energy	https://thewonderofscience.c	- Energy, Magnetism, and	Show of hands/3-2-1
In what ways can energy		om/phenomenon/2017/10/7	Electricity	
change from one form to	CCC.5 Energy and Matter	/drinking-bird	- Making a Flashlight Shine	Exit slips
another?	Students will use models to represent		- Law of Conservation of	
	relationships among different forms of	SEP.1 Asking Questions and	Energy	Project rubrics
How is energy transferred?	energy.	Defining Problems		
		Students will be able to ask	Engineering Activities	Lesson quizzes and
How does the law of	Key terms:	questions and identify the	- Designing a Prosthetic Limb by	unit test
conservation of energy	- energy	problem when a non-electric	discovering the properties of	
apply to transformations	- motion	doorbell that a science student	materials and changes in energy	Lesson checks
and transfers?	- force	makes doesn't work properly.		
	- work		BP Energy lessons	Reading checks
	- power	SEP.2 Developing and using	https://www.bp.com/content/da	
	- kinetic energy	Models	m/bp/country-sites/en_us/united	QUEST project "How
	- potential energy	Develop a model to demonstrate	<u>-states/home/documents/commu</u>	can you build a
	- gravitational potential energy	the phenomena of energy	<u>nity/science-fair-book-bp-interme</u>	complicated machine
	- elastic potential energy	transfer.	<u>diate.pdf</u>	to do something
	- mechanical energy			simple?"
	- nuclear energy	Develop a model to describe that	Exploring Energy	
	- thermal energy	when the arrangement of objects	https://www.teachengineering.org	Performance-Based
	- chemical energy	interacting at a distance changes,	/curricularunits/view/ucd_energy	Assessment "3, 2, 1
	- electrical energy	different amounts of potential	unit	Liftoff" - Students will
	- electromagnetic radiations	energy are stored in the system.		develop a model that
	- pivot		PBS Energy Labs	explains the
	- Law of conservation of energy	SEP.5 Using Mathematics and	https://www.pbs.org/wgbh/nova	relationship between
		Computational Thinking	/labs/about-energy-lab/educator-	potential and kinetic
		Evaluate expressions to identify	guide/	energy in a rocket
		the linear relationship of		system.
		gravitational potential energy and	Energy Detectives	
		the nonlinear relationship of	https://www.energy.gov/sites/pro	
		kinetic energy.	d/ files/ 2014/06/ file/ basics energ	
		SED7 Encocinc in Accument	<u>ydelecuves.pdr</u>	
		from Evidence	NEA Clean Energy Education	
		Construct use and present	http://www.peg.org/tools/clean.org	
		arguments to support the claim	nergy education html	
		that when the kinetic energy of	<u>nergy-education.num</u>	
		an object changes energy is		
		transferred to or from the object		
		transferred to or from the object.		

	Students will use text evidence to define energy, motion, work and force, and determine the relationships among them.	
	Hands-On Labs	
	Virtual Labs	
	Online webquests	
	Topic Enrichments	
	Graphic Organizers	
	Scientific arguments (CER)	
	Science Videos	
	Science Stations	
	Interactive Science Journals	
	Digital Learning	

Unit #4: Thermal Energy

Enduring Understandings:	Essential Questions:
• Temperature is a measure of the average kinetic energy of particles of	• What happens when heat flows from one object to another?
matter. The relationship between the temperature and the total energy of	 How does molecular motion relate to thermal energy?
a system depends on the types, states, and amounts of matter present.	• How are thermal energy and temperature related?
• The amount of energy transfer needed to change the temperature of a	
matter sample by a given amount depends on the nature of the matter, the	
size of the sample, and the environment.	
• When the motion energy of an object changes, there is inevitably some	
other change in energy at the same time.	
Interdisciplinary	Connections

NJSLS Mathematics MP.2 Reason abstractly and quantitatively.

• <u>Example</u>: Students will use equations to convert units from Celsius to Kelvin and Fahrenheit.

NJSLS Computer Science and Design Thinking 8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.

• <u>Example:</u> Students will describe how the concept of thermal energy applies to the concept of glass blowing.

Career/Real World Connections

Careers

- Thermal Engineering is a specialized sub-discipline of mechanical engineering and chemical engineering that deals with the movement of heat energy and transfer. The energy can be transformed between two mediums or transferred into other forms of energy. A thermal engineer will have knowledge of thermodynamics and the process to convert generated energy from thermal sources into chemical, mechanical, or electrical energy.
- HVAC technician HVAC is an abbreviation for heating, ventilation, and air conditioning. A qualified HVAC technician is a technician who installs, maintains, and repairs heating, ventilation, air conditioning, and refrigeration systems that control the temperature and air quality in buildings.

Real World Connections

• Earth's climate and weather are determined by energy transfer. The energy that warms Earth comes from the Sun. Some places on Earth absorb more energy than others and become warmer, and heat travels from warmer places to cooler places by the movement of air and ocean currents; the movement of air and water by these currents contributes to climate and weather.

- The process of glassblowing involves using a very hot oven to soften the glass. The glassblower can then shape the glass because it is so pliable. The heat transfer from an oven or torch is transferred to the class, causing the glass particles to move faster. As the particles move faster and faster, the glass softens. Once the glass is flexible, glass blowers blow air into it forcing the glass to expand and change shape.
- Global Warming thermal energy can be used to describe events related to climate change. Some greenhouse gases absorb energy. This slows the loss of heat to space, keeping Earth warmer than it otherwise would be (greenhouse effect).
- Hurricanes Hurricanes take heat from the oceans and convert it to the energy of their winds. They take thermal energy and make mechanical energy out of it. The natural engine that is a hurricane is fueled by warm, moist air, so warmer ocean water from global warming evaporates more easily. That means that more heat energy makes its way into the atmosphere, causing bigger, more powerful hurricanes to develop.

Guiding / Topical Questions with Specific Standards		Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	What happens to a	Students investigate the relationship between	Phenomena:	Elevate Interactivities:	Open-ended quiz
PS3-3	substance when it is	temperature, thermal energy, and heat.	- Earthships	- Flow of Thermal	
	heated?		https://thewonderofscience.com/	Energy	Think Pair Share
MS-		Students model various methods of heat	phenomenon/2018/7/5/earthship	- A Rising	
PS3-4	What is the difference	transfer and describe what happens to energy	<u>S</u>	Thermometer	Four corners
	between thermal energy	during transformations.	- Ice-cutting experiment	- Methods of	
MS-	and temperature?		https://thewonderofscience.com/	Thermal Energy	Science notebooks
PS3-5		Students investigate and describe how different	phenomenon/2018/7/12/ice-cutti	Transfer	
	How is energy conserved	materials respond to heat.	ng-experiment	- Heat and Reheat	Discussions/socratic
9.4.8.	during transformations?		- Candle-Powered Car		seminars
CI.2		CCC.3 Scale, Proportion, and Quantity	https://thewonderofscience.com/	<u>Hands-On Labs:</u>	
	How do different materials	Students will construct graphs to identify the	phenomenon/2018/7/8/candle-po	- How Cold is the	Graphic Organizers
	respond to heat?	proportional relationship between Celsius and	wered-car	Water?	
		Fahrenheit scales.	- Lava lamps	- Temperature and	Individual whiteboards
	How is friction related to			Thermal Energy	
	thermal energy and	CCC.5 Energy and Matter	SEP.3 Planning and Carrying Out		Lab reports
	temperature?	Students will use text evidence to describe and	Investigations	What is Heat?	
		explain how the total thermal energy of a	Plan an investigation to determine the	https://www.teachengi	open-ended
		system depends on the types, states, and	relationships among the energy	neering.org/lessons/vi	questioning
		amounts of matter present.	transferred, the type of matter, the	ew/ucd heat lesson01	
			mass, and the change in the average		Self assessments
		Key terms:	kinetic energy of the particles as	NASA- Heat,	
		- thermal energy	measured by the temperature of the	Temperature and	Peer assessments
		- heat	sample.	Conduction	
		- temperature		https://ngss.nsta.org/	Show of hands/3-2-1
		- conduction	SEP.5 Using Mathematics and	Resource.aspx?Resourc	
		- convection	Computational Thinking	<u>eID=229</u>	Exit slips
		- convection current			

	- radiation	Students will write a formula for	PBS - Thermal Energy	Project rubrics
	- conductor	converting temperature to degrees	Transfer	,
	- insulator	Celsius if given the temperature in	https://nj.pbslearning	Lesson quizzes and
	- specific heat	Kelvin or Fahrenheit.	media.org/resource/ls	unit test
	- thermal expansion		ps07-sci-phys-thermale	
	-	SEP.6 Constructing Explanations	nergy/thermal-energy-t	Lesson checks
		and Designing Solutions	ransfer/	
		Gather observations to judge		Reading checks
		temperature using senses, and explain	Ohio Energy- Thermal	_
		why temperature can be hard to gauge	Energy; Save the	QUEST project "How
		without a thermometer.	Penguins	can you keep hot water
			https://ohioenergy.org	from cooling down?"
		SEP.7 Engaging in Argument from	/wp-content/uploads/	_
		Evidence	2015/09/4-Thermal-T	Performance- Based
		Construct, use and present arguments	eacher-Lesson.docx	Assessment "Testing
		to support the claim that when the		Thermal Conductivity"
		kinetic energy of an object changes,		- Students will test
		energy is transferred to or from the		three different metals
		object.		to determine which
				one conducts the most
		Hands-On Labs		thermal energy over a
				10-minute interval, and
		Virtual Labs		use their results to
				select a metal for use as
		Online webquests		a heat sink.
		Topic Enrichments		
		Graphic Organizers		
		Scientific arguments (CER)		
		Science Videos		
		Science Stations		
		Interactive Science Journals		
		Digital Learning		

Unit #5: Intro to Earth's Systems

Enduring Understandings:	Essential Questions:			
• Earth's systems can be broken down into individual components, which	• How do matter and energy cycle through Earth's systems?			
have observable measurable properties	 How do changes in one part of the Earth system affect other parts of 			
 Earth's components form systems. These systems continually interact at 	the system?			
different rates of time affecting the Earth locally and globally.	 In what ways can Earth processes be explained as interactions among 			
 All Earth processes are the result of energy flowing and matter cycling 	Earth's spheres?			
within and among the planet's systems. This energy is derived from the				
sun and Earth's hot interior. The energy that flows and matter that cycles				
produce chemical and physical changes in Earth's materials and living				
organisms				
• Water continually cycles among land ocean and atmosphere via				
transpiration evaporation condensation crystallization and				
precipitation, as well as downhill flows on land				
 Global movements of water and its changes in form are propelled by 				
sunlight and gravity				
Interdisciplinary	Connections			
Interdisciplinary	Connections			
 NJSLS Mathematics MP.2 Reason abstractly and quantitatively. Example: Students will interpret a graph showing Arctic Sea Ice Extent over time, and predict what would happen to the extent of sea ice in the Arctic if temperatures continue to rise. 				
NISIS Social Studies 6.3.8 Civics PR 4 Use evidence and quantitative data to prov	pose or defend a public policy related to climate change			
Example: Students will make a claim about the causes of global warming, p	roviding evidence for their claim, and propose ways to reverse its effects.			
NJSLS World Languages 7.1.IM.PRSNT.7 Compare cultural perspectives regard	ing the degradation of the environment of the target culture(s), including the			
effects of climate change, with those of students'own culture.				
• Example: Students will share in discussion how different countries, especial	y those from their heritage, are dealing with the effects of climate change, and			
ways they are trying to help reduce their impacts.				
Career/Real Worl	d Connections			
Careers				
• Geomorphology is the study of landforms, their processes, form and sedim	ents at the surface of the Earth (and sometimes on other planets). Study			
includes looking at landscapes to work out how the earth surface processes,	such as air, water and ice, can mold the landscape. Geomorphologists study			
how the earth's surface is formed and changed by rivers, mountains, oceans	, air, and ice.			

- A cartographer is someone who makes maps through geospatial analysis and computer making. They also study maps to trace the spread of diseases and identify potential epidemics before they begin, helping save lives. Cartographers also make emergency maps during natural disasters which can be used by public health officials to help rescue efforts.
- Air traffic controllers coordinate movements of thousands of aircraft, keeping them at safe distances from each other as they travel. Much like the different layers of topography map or satellite imagery, an air traffic controller receives information from multiple air traffic management systems.

- Crime rate impacts the amount of law enforcement officers assigned to a specific area, and the amount of law enforcement officers impacts the level of crime experienced in the area. When the components of a system both impact each other, this creates a feedback loop.
- Greenland's ice sheet has been melting at an advanced rate due to global warming and runs into the ocean. Sea levels have risen at an average rate of 1.5 cm every decade for the past century, but have doubled in the past 25 years. Higher sea levels threaten infrastructure, lives and property. The higher sea levels cause Florida to become more vulnerable to deadly storms and coastal flooding.
- Climate change Water is released to the atmosphere through evaporation It then returns to Earth as rain and snow. Climate change influences the water cycle because as air temperatures increase, so does the amount of water that evaporates into the atmosphere. Warmer air can hold more water vapor, which can lead to more intense rainstorms that in turn cause major problems like flooding.

Guiding / Topical Questions with Specific Standards		Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	What are the different	Students will investigate and model the	Phenomena:	Elevate Interactivities:	Open-ended quiz
ESS2-1	components of the Earth	components of Earth's systems and the energy	- Yellowstone supervolcano	- Thermal Energy	
	system?	sources that drive the cycling of matter in Earth's	https://thewonderofscience.com	and the Cycling of	Think Pair Share
MS-		systems.	/phenomenon/2018/7/5/yellow	Matter	
ESS2-4	What are the sources of		stone-supervolcano	- Describing Systems	Four corners
	energy for the processes	Students will investigate and model landforms.	- UAE Building a Mountain to	- Fire and the Earth's	
9.4.8.	that affect Earth?	Students will also study the forces of energy that	Increase Rainfall	Spheres	Science notebooks
DC.8		affect the geosphere, including how landforms are	https://thewonderofscience.com	- Forida Landforms	
	How can you model the	created.	/phenomenon/2018/6/10/uae-	- Constructive and	Discussions/socratic
	cycling of matter in the		building-a-mountain-to-increase-	Destructive Forces	seminars
	Earth system?	Students will investigate the places and forms in	rainfall	- Maps and Method	
		which water is found on Earth and how water is	- Augmented Reality Sandbox	- Disrupting the	Graphic Organizers
	What are the different	cycled through Earth's systems.	https://thewonderofscience.com	Geospheres	
	landforms found on		/phenomenon/2018/5/13/aug	- The Water Cycle	Individual whiteboards
	Earth?	CCC.7 Stability and Change	mented-reality-sandbox	- Floridan Aquifer	
		Students will develop and use models to	- Saharan Desert Drift	System	Lab reports
	What forces and energy	demonstrate how a system returns information	https://www.washingtonpost.co	- Siting a Fish Farm	
	make the different	about itself and that information results in	m/news/speaking-of-science/wp	- Impact on the	open-ended
	landforms?	change.	/2016/05/11/how-dust-from-th	Hydrosphere	questioning
			e-sahara-fuels-poisonous-bacteria		

What are the various ways	CCC.5 Energy and Matter	-blooms-in-the-caribbean/?arc40	<u>Hands-On Labs:</u>	Self assessments
to model landforms?	Students will develop and use models to	<u>4=true</u>	- What Interactions	
	demonstrate how the sun's energy is the force that	- The Case of the Shrinking Sea	Occur Within	Peer assessments
Where and in what	drives the water cycle.	(Aral Sea)	Earth's Systems?	
features is water found on			- Where Heat Flows	Show of hands/3-2-1
Earth?	Key terms:	SEP.2 Developing and Using	- Interaction Action	
	- atmosphere	Models	- Surface Features	Exit slips
How does water cycle	- geosphere	Develop a model to describe the	- Water on Earth	1
through Earth's systems?	- hydrosphere	cycling of Earth's materials and the		Project rubrics
	- cryosphere	flow of energy that drives this	Engineering design	,
	- biosphere	process.	challenge: A Daring	Lesson quizzes and
	- energy	1	Bridge	unit test
	- topography	Develop a model to describe the		
	- landform	cycling of water through Earth's	NASA- Connect the	Lesson checks
	- mountain	systems driven by energy from the	Spheres	
	- coastline	sun and the force of gravity.	https://gpm.nasa.gov/	Reading checks
	- dune		education/lesson-plans	
	- river	Hands-On Labs	/connect-spheres-earth	QUESTproject - How
	- delta		-systems-interactions	can you predict the
	- surveying	Virtual Labs		effects of a forest fire?
	- water cycle		NOVA Earth's Systems	
	- evaporation	Online webquests	https://nj.pbslearning	Performance-Based
	- transpiration	-	media.org/collection/e	Assessment "Modeling
	- condensation	Topic Enrichments	arths-systems/	a Watershed" -
	- precipitation	-		Students will design
	- watershed	Graphic Organizers	Earth System Science	and model the effects
	- aquifer		Activities (SERC)	of pollution on surface
	- well	Scientific arguments (CER)	https://serc.carleton.e	water in a watershed,
			<u>du/serc/site_guides/es</u>	
		Science Videos	s_activities.html	
		Science Stations		
		Interactive Science Journals		
		Digital Learning		

Unit #6: Weather in the Atmosphere

Enduring Understandings:	Essential Questions:				
• The complex patterns of the changes and the movement of water in the	• What determines weather on Earth?				
atmosphere, determined by winds, landforms, and ocean temperatures	• What regulates weather and climate?				
and currents, are major determinants of local weather patterns.					
• Because these patterns are so complex, weather can only be predicted					
probabilistically.					
• Human activities have significantly altered the biosphere, sometimes					
damaging or destroying natural habitats and causing the extinction of					
other species. But changes to Earth's environments can have different					
impacts (negative and positive) for different living things.					
• Typically as human populations and per-capita consumption of natural					
resources increase, so do the negative impacts on Earth unless the					
activities and technologies involved are engineered otherwise.					
• Water continually cycles among land, ocean, and atmosphere via					
transpiration, evaporation, condensation and crystallization, and					
precipitation, as well as downhill flows on land.					
• Variations in density due to variations in temperature and salinity drive a					
global pattern of interconnected ocean currents.					
• Weather and climate are influenced by interactions involving sunlight, the					
ocean, the atmosphere, ice, landforms, and living things. These					
interactions vary with latitude, altitude, and local and regional geography,					
all of which can affect oceanic and atmospheric flow patterns.					
• The ocean exerts a major influence on weather and climate by absorbing					
energy from the sun, releasing it over time, and globally redistributing it					
through ocean currents.					
• Mapping the history of natural hazards in a region, combined with an					
understanding of related geologic forces can help forecast the locations					
and likelihoods of future events.					
Interdisciplinary	Connections				
NJSLS Mathematics MP.2 Reason abstractly and quantitatively.					

• Example: Students will review a graph showing Arctic Sea Ice Extent and determine the trend in the data. They will also predict what will happen in the future based on this trend.

NJSLS Computer Science and Design Thinking 8.2.8.ETW.4 Compare the environmental effects of two alternative technologies devised to address climate

change issues and use data to justify which choice is best.

• Example: Students will analyze and interpret data to describe evidence that technological advances including cars, factories, and power plants have affected the water cycle, leading to changes in climate such as droughts and more intense storms.

Career/Real World Connections

<u>Careers</u>

- Meteorologists are scientists who study the weather and help keep the public safe by informing them about severe weather events. Meteorologists make predictions about the weather based on advanced monitoring techniques, measurement tools, and computer-based forecasting programs.
- A storm chaser is an atmospheric and space scientist who studies global patterns of atmospheric movement, fronts, temperature, and pressure systems looking for severe weather disturbances. Their job is to track the development and storms and collect data from the storm as it is occurring. The data is used to predict behavior of future storms and is used in media broadcasts about the storm. Weather broadcasts help towns prepare for severe weather and limit damage and destruction caused by storms.

- The ozone layer is a region in the stratosphere that contains high concentrations of ozone gas. Ozone absorbs most of the sun's harmful ultraviolet light. During the twentieth century, many aerosol sprays contained chlorofluorocarbons (CFC's), which destroy ozone when they reach the upper atmosphere. A large hole formed in the ozone layer of the Southern Hemisphere, threatening animal and plant communities and causing a spike in skin cancer. In response, the United States and Europe banned CFCs in 1996, and as a result, the ozone hole is now shrinking.
- Pollution is a result of toxic chemicals that are released into the atmosphere and water sources. As the pollution enters the atmosphere, it mixes with the water vapor in the air. When the water vapor returns to Earth as precipitation, so do the dangerous toxins. Rain that contains toxins is referred to as acid rain and can harm plants. Vegetation plays a large role in the water cycle.
- The jet stream is a band of high winds that blow from the west to the east. Air masses are moved along by the jet stream and in turn have a major impact on the weather. By flying in a jet stream, planes traveling from west to east get a significant boost from the tailwind, which saves time and fuel. Conversely, planes flying in the opposite direction lose time and expend more fuel by flying into the headwind a jet stream produces, and pilots usually adjust their flying altitude to avoid them.
- Early detection of approaching storms plays a crucial part in public safety. Due to technological advancements, scientists can now predict the path of a storm and warn people to evacuate or take shelter.

Guiding / Topical Questions with Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
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MS-	What is the composition	Students investigate the composition and	Phenomena:	Elevate Interactivities:	Open-ended quiz
ESS2-4	and structure of the Earth's	structure of Earth's atmosphere and the way	- Rainbows, moonbows	- Mountaintop Meal	
	atmosphere?	that energy from the sun affects Earth's	- Rare cloud formations	Preparations	Think Pair Share
MS-		atmosphere.	- Funnel clouds	- Layers of the	
ESS2-5	How does energy from the		- Light pillars	Atmosphere	Four corners
	Sun affect Earth's	Students investigate how water is always moving	- The Driest Place on Earth	- Patterns in the	
MS-	atmosphere?	between the surface of Earth and the	https://thewonderofscience.com/	Wind	Science notebooks
ESS2-6		atmosphere, the processes that drive the water	phenomenon/2018/6/15/the-drie	- Ways that Water	
	What processes make up	cycle, and how the water cycle affects the	<u>st-place-on-earth</u>	Moves	Discussions/socratic
MS-	the water cycle?	weather.	- Why Does the Wind Blow?	- Water Cycle	seminars
ESS3-2			https://thewonderofscience.com/	- Interruptions in the	
	How does energy drive the	Students investigate the movement of air masses	phenomenon/2018/6/15/why-doe	water Cycle	Graphic Organizers
MS-	processes of the water	of the different temperatures and humidities to	s-the-wind-blow	- Making Water Safe	
PS1-4	cycle?	identify the type of fronts and the types of	- Rolling Clouds	to Drink	Individual whiteboards
		weather that can develop.	https://youtu.be/OrQiTbuoE5Y	- Weather and Severe	
9.4.8.	How does the water cycle			Weather	Lab reports
CI.1	affect weather?	Students learn how meteorologists use direct	SEP.2 Developing and Using	- When Air Masses	
		observations, pattern analysis, and technology	Models	Collide	open-ended
9.4.8.	How do global patterns,	to predict the weather.	Students will develop and use models	- Mapping Out the	questioning
DC.8	such as the jet stream,		to demonstrate water is always moving	Weather	
	affect air masses?	Students examine and describe damage	between the surface of Earth and the	- All About Air	Self assessments
9.4.8.		associated with severe storms, as well as	atmosphere.	Masses	
IML.5	How do air masses interact	measures that can be taken to ensure safety in a		- Using Air Masses to	Peer assessments
	to form fronts?	storm.	Students will develop and use a model	Predict Weather	
			to describe how unequal heating and	- Weater Predicting	Show of hands/3-2-1
	How do the interactions of	CCC.1 Patterns	rotation of the Earth cause patterns of	- Tracking Weather	
	air masses result in changes	Students will constrict explanations using	atmospheric and oceanic circulation	 Predicting Severe 	Exit slips
	in weather?	reasoning to predict similar patterns by	that determine regional climates.	Weather	
		recognizing that pattern analysis is essential for		- Not in Kansas	Project rubrics
	How do meteorologists use	weather forecasting.	SEP.3 Planning and Carrying Out	Anymore	
	the interactions of air		Investigations	- Tinkering with	Lesson quizzes and
	masses to forecast changes	CCC.2 Cause and Effect	Students will collect data to provide	Technology	unit test
	in weather?	Students will analyze cause-and-effect	evidence for how the motions and	- Severe Weather	
		relationships in order to predict how	complex interactions of air masses	Experiences	Lesson checks
	How does technology aid in	temperature determines the type of	results in changes in weather		
	collecting and analyzing	precipitation for an area.	conditions.	<u>Hands-On Labs:</u>	Reading checks
	weather data?			- Puddle	
		CCC.4 Systems and System Models	SEP.4 Analyzing and Interpreting	Befuddlement	QUEST project "How
	How do weather maps help	Students will develop a model to describe the	Data	- Effects of Altitude	can you prepare for
	to model current weather	cycling of water through Earth's systems driven	Students will analyze and interpret data	on the Atmosphere	severe weather?"
	and predict future weather?	by energy from the sun and the force of gravity.	on natural hazards to forecast future	- Water in the Air	
			catastrophic events and inform the	- How Clouds and	Performance-Based
		CCC.5 Energy and Matter		Fog Form	Assessment "Water

How does severe weather	Students will analyze and interpret data to	development of technologies to	- Weather Fronts	From Trees" - Students
affect human life?	describe evidence that water is continually	mitigate their effects.	- Predicting	explore the role of
	evaporating and condensing from the		Hurricanes	plants in the water
How do humans protect	atmosphere to form clouds. Within a natural or	Students will develop and use models		cycle through direct
themselves from severe	designed system, the transfer of energy drives	to demonstrate how air masses of	Engineering Design	observation. They will
weather?	the motion and/or cycling of matter.	different temperatures and humidity	Challenge:	design and implement
		collide, resulting in a front.	- Build a Dew Catcher	a four-day experiment
	Key terms:		- Catching Water With	to gather evidence that
	- atmosphere	Hands-On Labs	a Net	trees transpire.
	- air pressure			
	- altitude	Virtual Labs	NOAA- Weather and	
	- wind		Atmosphere	
	- water cycle	Online webquests	https://www.noaa.gov	
	- evaporation		/education/resource-c	
	- condensation	Topic Enrichments	ollections/weather-atm	
	- dew point		osphere	
	- humidity	Graphic Organizers		
	- relative humidity		NEA Weather	
	- precipitation	Scientific arguments (CER)	Forecasting	
	- air mass		http://www.nea.org/to	
	- jet stream	Science Videos	ols/lessons/64127.htm	
	- front			
	- cyclone	Science Stations	Teach Engineering-	
	- anticyclone		Weather and	
	- meteorologist	Interactive Science Journals	Atmosphere	
	- storm		https://www.teachengi	
	- thunderstorm	Digital Learning	neering.org/curricularu	
	- hurricane		nits/view/cub_weather	
	- tornado		<u>_curricularunit</u>	
	- storm surge		NT 1 XX7 1	
	- flood		National Weather	
	- drought		Service	
			<u>https://www.weather.g</u>	
			<u>ov/owne/science_tp</u>	
			Sahalaatia Waathaa	
			and Climato	
			https://www.scholastic	
			com/teachers/activitie	
			s/teaching-content/we	
			ather-and-climate-13 st	
			udviams-interactive-sci	
			ence-activities/	
			<u>ence acuvines/</u>	

Unit #7: Minerals and Rocks in the Geosphere

Enduring Understandings:	Essential Questions:		
 All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. 	 What events form Earth's rocks? How do rocks and minerals cycle through our environment? Why are rocks and minerals important to our health and to our economy? 		
Interdisciplinary Connections			

NJSLS Mathematics 6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers

• Example: Students will calculate density of minerals using the equation *Density= mass/volume*.

NJSLS Mathematics 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

• Example: Students will create a graph comparing Pressure vs. Depth Deep Inside Earth. They will determine the dependent and independent variable and analyze their relationship to explain how pressure is related to depth.

NJSLS Social Studies 6.1.5.GeoPP.2: Describe how landforms, climate and weather, and availability of resources have impacted where and how people live and work in different regions of New Jersey and the United States.

• Example: Students will learn how mineral resources (such as gold) led people to travel west in the search for gold, leading to westward Expansion.

Career/Real World Connections

Careers

• Geologists are people who study Earth's structures and processes. There are many careers in geology, including volcanologists who study volcanoes and how, when, where, and why they form. They may also study historic and prehistoric volcanoes, such as those that erupted in what is now India around the

time the non-avian dinosaurs went extinct approximately 65 million years ago. Other careers in geology include seismology, or the study of earthquakes, and paleontology, or the study of prehistoric life and Earth's ancient ecosystems.

• Geological Field Technicians will collect, examine and identify resources found beneath the earth's surface, in order to determine their mineral content, through this they are able to help indicate the potential area of a mine site.

- Plate Tectonics- Because of convection currents in the Earth's mantle, the crust at Earth's surface is always moving. Examples of this can be seen all over the world. In Iceland, the Mid-Atlantic ridge is a place where two plates are moving away from each other, pushed apart by magma rising to the surface. This magma is a result of convection, and the movement of the plates results from convection currents. Part of the Mid-Atlantic Ridge is located above ground, in Iceland. People can actually walk between the two plates.
- Minerals are those elements on the earth and in foods that our bodies need to develop and function normally. Those essential for health include calcium, phosphorus, potassium, sodium, chloride, magnesium, iron, zinc, iodine, chromium, copper, fluoride, molybdenum, manganese, and selenium.
- Using Rocks as Building Materials Many types of rocks can be used as construction materials including basalt, marble, limestone, sandstone, quartzite, travertine, slate, gneiss, laterite, and granite. The rocks used for building construction should be hard, durable, tough, and should be free from weathered soft patches of material, cracks, and other defects that are responsible for the reduction of strength and durability.

Guidi wit	ng / Topical Questions th Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	How do geologists study	Students investigate how scientists study	Phenomena:	Elevate Interactivities:	Open-ended quiz
ESS2-1	Earth's layered interior?	Earth's materials and model its layers.	- Desert Rose Selenite	- Earth's Layers	
			https://www.youtube.com/wa	- Hot on the Inside	Think Pair Share
9.4.8.	What roles do heat and	Students study the processes that form	tch?v=huShfNiQG00	- Comparing Earth and Mars	
CT.3	pressure in Earth's interior	minerals and the characteristics and	-	- A Curious Word	Four corners
	play in the cycling of	properties of minerals.		- The Deep Drill	
	matter?		SEP.2 Developing and Using	- Designing Satellites	Science notebooks
		Students study the three basic types of rocks	Models Develop a model to	- So Many, Many Minerals	
	What are the patterns and	and how rocks form.	describe the cycling of Earth's	- Mineral Management	Discussions/socratic
	effects of convection in		materials and the flow of energy	- Don't Take it for Granite	seminars
	Earth's mantle?	Students investigate the materials that make	that drives this process.	- Is There a Geologist in the	
		up Earth, how they are continuously cycled,		House?	Graphic Organizers
	What are the	and what energy flows drive Earth's	SEP.6 Constructing	- Rocky Changes	
	characteristics and	processes.	Explanations and Designing	- Rock cycle	Individual whiteboards
	properties of minerals?		Solutions	- Rocks on the Move	
		CCC.5 Energy and Matter	Students will construct a scientific		Lab reports
	What processes result in	Students will develop a model to show how	explanation based on evidence for	<u>Hands-On Labs:</u>	
	the formation of minerals?	the cycling of Earth's processes is driven by	how the uneven distributions of	- Mineral Mash-Up	open-ended
		the flow of energy from inside of the Earth.	Earth's mineral, energy and	- A Sequined Rock	questioning
			groundwater resources are the	- Name that Rock	

What processes explain	CCC.7 Stability and Change	result of past and current	- Ages of Rocks	Self assessments
the distribution of mineral	Students will develop and use models to	geoscience processes.	- Build a Model of Earth	
resources on Earth?	demonstrate how processes that occur on		- Heat and Motion in a	Peer assessments
	Earth's surface and in the crust and mantle	Hands-On Labs	Liquid	
What are the three major	slowly change rock from one kind to		- Growing a Crystal Garden	Show of hands/3-2-1
types of rocks and how do	another.	Virtual Labs	- Make Your Own	,
they form?			Stalagmites and Stalactites	Exit slips
, ,	Key terms:	Online webguests	- Rock vs. Rock	1
How is the formation of	- seismic wave	1	- Ages of Rocks	Project rubrics
rocks the result of the flow	- crust	Topic Enrichments	- Paper or Plasticor Rock?	
of energy and cycling of	- mantle	Tople Emilian	ruper of russiemor risem	Lesson quizzes and
matter within Earth?	- outer core	Graphic Organizers	Engineering Design Challenge	unit test
matter within Dartin.	- inner core	Graphic Organizers	"Examining Earth's Interior	unit test
How are Earth's materials	- mineral	Scientific arguments (CER)	from Space"	Lesson checks
cycled in the rock cycle?	crystal	Scientific arguments (CEIK)	nom opace	Lesson cheeks
cycled in the lock cycle.	crystallization	Science Videos	Case Study, "Mighty Maupa	Reading checks
How does the flow of	igneous rock	Science videos	Loc"	Reading checks
aparay drive the processes	sadimentary rock	Science Stations	LUa	OUEST project "How
of the rock cycle?	- sedimentary lock	Science Stations	Evidence based assessment:	QUEST project Thow
of the fock cycle:	- sediment	Internative Science Iournals	What role does heat	
	- metamorphic rock	Interactive Science Journais	- what fole does heat,	processes in a movie
	- FOCK CYCIE	Disital Language	Eastly's interior along in the	script?
		Digital Learning	Earth's interior play in the	
			cycling of matter?	Performance- Based
				Assessment The Rock
			Geology.com	Cycle in Action" -
			https://geology.com/teacher/	Students are expected
			rocks.shtml	to plan and model the
				information of rocks
			PBS Geology- Rocks and	with crayons or crayon
			Minerals	rocks.
			https://nhpbs.org/kn/vs/scila	
			<u>b8f8.asp</u>	
			Scholastic - The Earth, Rocks	
			and Minerals	
			<u>https://nhpbs.org/kn/vs/scila</u>	
			<u>b8f8.asp</u>	
			Smithsonian - Minerals,	
			Crystals and Gems	
			http://www.smithsonianeduca	
			tion.org/educators/lesson_pla	
			ns/minerals/	

Unit #8: Plate Tectonics

Enduring Understandings:	Essential Questions:			
 Tectonic processes continually generate new ocean sea floor at ridges and destroy old seafloor at trenches. Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. 	 How do geological processes change Earth's surface? Why do the continents move, and what causes earthquakes and volcanoes? 			
Interdisciplinary Connections				
NJSLS Mathematics MP.2 Reason abstractly and quantitatively.				

• Example: Students will use evidence from GPS reading to predict how fast the North American Plate is moving away from the Mid-Atlantic Ridge.

NJSLS Social Studies 6.1.5.GeoSV.4: Use a variety of geographic representations to describe the similarities and differences between places in New Jersey, the United States, and the world (e.g., maps, data visualizations, graphs, diagrams, aerial and other photographs, GPS).

• Example: Students will use Google Earth to compare the topography and geologic differences among parts of the US and around the world, and identify how these geologic changes are a result of tectonic forces.

Career/Real World Connections

Careers

- Structural architects design buildings and other structures, taking into consideration safety, functionality and aesthetics. When planning the seismic safety of a building, structural engineers must design the support elements of shorter buildings to withstand greater forces than those of taller buildings.
- Seismologists actively study earthquakes and vibrations within the earth. Seismologists use sophisticated tools such as seismographs, which measure the intensity of an earthquake. They also use computers to help generate graphical models of the vibrations of the Earth.

Real World Connections

• Geothermal Energy - Internal energy from the ground close to a volcano can provide an unlimited supply of energy. This type of energy is referred to as geothermal energy. People can use this source of renewable energy rather than relying on fossil fuels.

- Earthquake early-warning systems use earthquake science and seismic monitoring technology to alert people when shaking waves generated by an earthquake are experienced. Currently, early detection systems only provide an advanced warning of seconds to minutes. Early-warning system technology is too new to support public warnings. Once the system has been fully developed, it will begin issuing public notifications.
- Lessons learned from Mount St. Helens On May 18, 1980, Mount St. Helens surprised everyone by erupting, and it did so in a big way. The peak exploded, dropping by about 2500 meters and leaving a giant crater. The explosion wiped out 230 square miles of land, including homes, trees, and the people and animals that inhabited the region.

Cuit	Cuiding / Tarias 1 Questions				
Guidi	th Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources	Assessment
WI	in opeenie olandarao			and Materials	Strategies
MS-	What evidence supported	Students investigate evidence that supports the	Phenomena:	Elevate Interactivities:	Open-ended quiz
ESS2-2	the hypothesis of	hypothesis of continental drift and the existence	- Pele's Hair	- Puzzling Pieces	
	continental drift?	of Pangaea.	- Snow Chimneys	- Land and Sea-Floor Patterns	Think Pair Share
MS-			- Volcano from Space	- Slow and Steady	
ESS2-3	What roles do mid-ocean	Students examine how convection drives plate	https://www.ngsspheno	- Puzzling Pieces	Four corners
	ridges and ocean trenches	motion and how the movement of Earth's	mena.com/#/volcano-fr	- Relative Plate Motion	
MS-	play in the movement of	plates has greatly changed the locations of the	om-space/	- By No Fault of Their Own	Science notebooks
ESS3-2	plates?	continents and the size and shape of the ocean	- Geysers	- Stressed to a Fault	
	-	basins. Students learn the ways that plates move	https://www.ngsspheno	- Locating an Earthquake	Discussions/socratic
9.4.8.	How do Earth's plates	at plate boundaries.	mena.com/#/geiser-bef	- Earthquake Engineering	seminars
CI.3	move?		ore-it-erupts/	- Placing a Bay Area Stadium	
		Students learn how tension, shearing and	- Marianas Trench	- Quaking and Shaking	Graphic Organizers
9.4.8.	How do Earth's surface	compression produce faults and other features.	https://thewonderofscie	- Moving Volcanoes	
IML.5	features support the theory	Students then analyze these features and events	nce.com/phenomenon/2	- Landforms from Volcanic	Individual whiteboards
	of plate tectonics?	at Earth's surface to determine their relationship	018/6/10/the-marianas-t	Activity	
		with plate boundaries.	rench-deepest-ocean	- Volcanoes Changing Earth's	Lab reports
	What are the products of		- Zealandia	Surface	
	plate movement at different	Students examine the role that volcanic activity	https://www.nationalgeo		open-ended
	scales?	plays in shaping Earth's surfaces as well as the	graphic.org/encyclopedia	<u>Hands-On Labs:</u>	questioning
		hazard that different types of volcanoes pose. In	<u>/zealandia/</u>	- How Are Earth's Continents	
	How do plate movement	addition, students explore the relationship		Linked Together?	Self assessments
	and stress produce new	between plate tectonics and volcanic eruptions	SEP.4 Analyzing and	- How Are the Continents	
	landforms?	and landforms.	Interpreting Data	Linked Together?	Peer assessments
			Analyze and interpret data	- Piecing Together a	
	What are earthquakes and	CCC.1 Patterns	on the distribution of fossils	Supercontinent	Show of hands/3-2-1
	tsunamis, and why do they	Students analyze and interpret data about	and rocks, continental	- Patterns in the Cascade Range	
	occur?	patterns in the Cascade Range to forecast the	shapes, and seafloor	- Plate Interactions	Exit slips
		locations and likelihoods of future volcanic	structures to provide	- Stressing Out	
		eruptions.	evidence of the past plate	- Analyze Earthquake Data to	Project rubrics
			motions.	Identify Patterns	

How can the effects of	CCC.3 Scale, Proportion, and Quantity		- Signs of Eruption?	Lesson quizzes and
earthquakes and tsunamis	Construct an explanation based on evidence for	SEP.6 Constructing	- Moving Volcanoes	unit test
be mitigated?	how geoscience processes have changed Earth's	Explanations and	_	
0	surface at varying time and spatial scales.	Designing Solutions	Case Study: Australia on the	Lesson checks
How is plate tectonics		Construct an explanation	Move	
connected to volcanic	CCC.7 Stability and Change	based on evidence for how		Reading checks
eruptions and landforms?	Students will identify the direction of plate	geoscience processes have	Engineering Design: Designing	_
-	movement and predict the direction that the	changed Earth's surface at	to Prevent Destruction	QUEST project "How
What role does volcanic	plates move.	varying time and spatial		safe is it to hike around
activity play in shaping	<u> </u>	scales.	Plate Tectonics CER	Mount Rainier?"
Earth's surface?	Key terms:		https://docs.google.com/docum	
	- mid-ocean ridge	Hands-On Labs	ent/d/1Mh8WvetPtrQZ4BFZA	Performance-Based
What hazards do different	- sea-floor spreading		YvTgXrYF2K75zQsA TweSUk	Assessment: "Modeling
types of volcanoes pose?	- subduction	Virtual Labs	RHc/edit	Sea-Floor Spreading" -
	- ocean trench			Students explore the
	- divergent boundary	Online webquests	National Geographic- Plate	reasons why building a
	- convergent boundary	-	Tectonics	pipeline that spans a
	- transform boundary	Topic Enrichments	https://www.nationalgeographic.	divergent zone is a bad
	- stress	-	org/topics/resource-library-plate	idea. They will design
	- tension	Graphic Organizers	-tectonics/?q=&page=1&per_pa	and conduct a model
	- compression		<u>ge=25</u>	that demonstrates why
	- shearing	Scientific arguments (CER)		the pipeline plan is a
	- fault		PBS Plate Tectonics	problem.
	- earthquake	Science Videos	https://nj.pbslearningmedia.org/	
	- magnitude		resource/ess05.sci.ess.earthsys.lp	
	- tsunami	Science Stations	platetectonics/plate-tectonics/	
	- volcano			
	- magma	Interactive Science Journals	National Park Service- Plate	
	- lava		Tectonics	
	- hot spot	Digital Learning	https://www.nps.gov/subjects/g	
	- extinct		eology/teaching-resources-plate-t	
	- dormant		ectonics.htm	
			Snack Tectonics	
			https://www.windows2universe.	
			org/teacher_resources/teach_sna	
			cktectonics.html	
			Smithsonian- Plate Tectonics	
			https://naturalhistory.si.edu/edu	
			cation/teaching-resources/earth-	
			science/plate-tectonics	

Unit #9: Earth's Surface Systems

 Enduring Understandings: The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. 	 Essential Questions: What processes change Earth's surface? How do the properties and movements of water shape Earth's surface and affect its systems?
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Interdisciplinary Connections

NJSLS Mathematics MP.2 Reason abstractly and quantitatively.

• Example: Students will construct a double-line graph and analyze and interpret the data to compare the weathering rates of limestone.

NJSLS Mathematics 7.RP.3 Use proportional relationships to solve multistep ratio and percent problems.

• Example: Students will analyze the proportional relationships in a graph of California Winter Precipitation to predict and explain the conditions that lead to a landslide.

Career/Real World Connections

Careers

- Soil conservationists are scientists who look for ways to replenish soil and to keep it from eroding. They plan the application of total resource management systems and provide conservation planning assistance from initial evaluation to completion. Soil conservationists possess a practical knowledge of the methods and techniques of soil, water, and environmental conservation as they relate to agricultural operations and land use measures.
- Civil engineers are responsible for all of the work that benefits the citizens of a society. After a natural disaster, civil engineers get involved in reconstruction efforts. Whether planning a new road or bridge, civil engineers must take into account the forces that change Earth's surface.

- Erosion of Man-Made Structures- Rain can cause or worsen problems with the erosion of man-made structures. For example, Ennis House in Los Angeles was designed and built by Franklin Lloyd Wright for Charles and Mable Ennis in the early to mid-1920s. Over the years, it has appeared in movies as *House on Haunted Hill* (1958), *Blade Runner* (1982), and *Karate Kid Part III* (1989). Built on the slope of a hill, the house has always suffered from structural problems, but in 1994, an earthquake weakened a section of the retaining wall on the home's south side.
- Lascaux Caves- In the late summer of 1940, an 18-year-old named Marcel Ravidat discovered the entrance to a system of caves in the countryside near Montignac, France. He returned a few days later with friends, and together they found that the walls were covered in prehistoric art mostly depicting wild

animals. The cave system became a popular tourist attraction, but by the mid 1950s, contamination from human beings including carbon dioxide and humidity, had begun to damage the art. The cave was later closed and the paintings restored.

• Sand dunes are the result of deposition by wind. Sand is a fine, granular material that is really very tiny pieces of rock, broken off from larger pieces of rock by weathering or some other erosive process. Sand can be easily picked up by the wind and carried away from its original location. Over time, as more and more sand gets deposited, sand dune(s) will form.

Guidi wit	ng / Topical Questions h Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	How does erosion change	Students learn the two agents of weathering,	Phenomena:	Elevate Interactivities:	Open-ended quiz
ESS2-2	Earth's surface?	mechanical and chemical weathering, and how	- Spherical boulders	- Dating Using	1 1
		these and other processes contribute to the	- How the Grand Canyon Formed	Weathering Rates	Think Pair Share
MS-	How does weathering	formation of soil.	https://thewonderofscience.com/	- Colors of the Sand	
ESS3-2	change Earth's surface?		phenomenon/2018/5/13/how-wa	- Classify the Forces	Four corners
	C	Students investigate the forces, causes, and	<u>s-the-grand-canvon-formed</u>	of Weathering	
9.4.8.	How does soil form?	relationship between erosion and deposition,	- Augmented reality sandbox	- Landslide	Science notebooks
TL.1		and explore how these processes help change	https://thewonderofscience.com/	Prevention	
	How does erosion change	Earth's surface features.	phenomenon/2018/5/13/augment	- Classify the Forces	Discussions/socratic
	Earth's surface?		ed-reality-sandbox	of Weathering	seminars
		Students model ways in which water causes		- Breaking it Down	
	How does weathering	erosion to learn how water creates landforms by	SEP.4 Analyzing and Interpret Data	- Material Slope	Graphic Organizers
	change Earth's surface?	carving out rock or building up sediment.	Analyze and interpret data on natural	Angle	
			hazards to forecast future catastrophic	- Predicting Disasters	Individual whiteboards
	How does soil form?	Students learn how glacial movement carves out	events and inform the development of	- Changing	
		valleys in the land and deposits sediment to	technologies to mitigate their effects.	Landscapes	Lab reports
		create new landforms, as well as how wave		- Learning rom	-
	What processes change	action contributes to the erosion and deposition	SEP.6 Constructing Explanations	Rocks	open-ended
	Earth's surface?	of beaches.	and Designing Solutions	- Carving a Canyon	questioning
			Construct an explanation based on	- Effects of Glaciers	
	How does mass movement	CCC.1 Patterns	evidence for how geoscience processes	- Glacial Ice	Self assessments
	change Earth's surface?	Students will explain how wind both builds up	have changed Earth's surface at	- Coastline	
		and wears down Earth's surface in a desert.	varying time and spatial scales.	Management	Peer assessments
	How does wind change				
	Earth's surface?	CCC.3 Scale, Proportion, and Quantity	Hands-On Labs	<u>Hands-On Labs:</u>	Show of hands/3-2-1
		Students observe models of geologic processes		- How Does Gravity	
	How does moving water	and phenomena (such as weathering and	Virtual Labs	Affect Materials on	Exit slips
	change Earth's surface?	erosion) that can take place over a variety of size		a Slope?	
		scales as well as a variety of time scales.	Online webquests	- Breaking Up is	Project rubrics
	What landforms form			Hard to Do	
	from water erosion and	Key terms:	Topic Enrichments	- Freezing and	Lesson quizzes and
	deposition?	- uniformitarianism		Thawing	unit test
		- erosion	Graphic Organizers		

How does groundwater	- mechanical weathering		- Small, Medium and	Lesson checks
change Earth?	- chemical weathering	Scientific arguments (CER)	Large	
	- soil		- Raindrops Falling	Reading checks
How do glaciers change	- humus	Science Videos	- Karst Topography	0
Earth's surface?	- sediment		- Mammoth Caves	QUEST project "How
	- deposition	Science Stations	- Glacier in a Cup	can I design and build
How do waves change	- mass movement		- Changing	an artificial island?"
Earth's surface?	- delation	Interactive Science Journals	Coastlines	
	- sand dune	5		Performance-Based
	- loess	Digital Learning	Engineering Design	Assessment "Materials
	- runoff	0	Challenge: Stop a	on a Slope" - Students
	- stream		Landslide	plan and model the
	- tributary			effects of gravity on
	- flood plain		PBS- Earth's Ever	erosion of sand hills.
	- delta		Changing Surface	They will form a
	- alluvial fan		https://ni.pbslearning	hypothesis about the
	- groundwater		media.org/resource/bu	relationship between
	- glacier		ac17-68-sci-ess-lpearth	the two and then plan
	- continental glacier		changesurface/earths-e	and carry out a test of
	- ice age		ver-changing-surface/	that hypothesis.
	- valley glacier			
	- plucking		Teach Earth Science -	
	- till		Weathering	
	- longshore drift		https://teachearthscien	
	0		ce.org/weathering.html	
			Common Sense	
			Education- Our	
			Changing Earth	
			https://www.commons	
			ense.org/education/les	
			son-plans/our-changin	
			<u>g-earth</u>	
			The Changing Earth	
			https://www.sausd.us/	
			<u>cms/lib/CA01000471/</u>	
			Centricity/Domain/10	
			5/Changing%20Earth	
			%20Learning%20Journ	
			<u>alfinal.pdf</u>	

Unit #10: Living Things in the Biosphere

 Enduring Understandings: All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). Within cells, special structures are responsible for particular functions and the cell membrane forms the boundary that controls what enters and leaves the cell. In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. 	 Essential Questions: How do scientists define and organize living things? How do organisms obtain and use the matter and energy they need to live and grow? 		
form tissues and organs that are specialized for particular body functions.			
Interdisciplinary Connections			

NJSLS Mathematics 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationships between the dependent and independent variables using graphs and tables, and relate these to the equation.

• Example: Students will use variables to write an expression to find the percentage of animals that swim compared to those that fly, or walk, run, or hop.

NJSLS World Languages 7.1.NM.IPRET.1: Identify familiar spoken and written words, phrases, and simple sentences contained in culturally authentic materials and other resources related to targeted themes.

• Example: Students will use a list of prefixes and suffixes in latin in order to help them understand science terms and scientific names that came from Latin and Greek cultures.

Career/Real World Connections

Careers

- Microbiologists study microorganisms such as bacteria, viruses, algae, fungi, and some types of parasites. They try to understand how these organisms live, grow, and interact with their environments.
- Evolutionary biologists study the changes that occur in plants and animals over time. They also look at the generational history of certain organisms so they can understand their origins. Evolutionary biologists might try to discover the earliest ancestors of modern humans or analyze a flu virus to understand how it develops resistance to vaccines. Their main objective is to study the origin of a particular species as well as document how its traits have changed throughout multiple generations.

- New species are discovered all the time. Many times, certain organisms are already classified, but because of DNA analysis scientists determined that these organisms should be classified as a new species. Most new species that have been discovered are insects, but other types of new organisms, like certain marine life, are classified as well. Typically, newly discovered species are found in remote locations.
- Adult Stem Cells- Cell division regularly occurs in adults, and when skin tissue is damaged or dying, the adult stem cells divide and replenish tissue cells as necessary. Because adult stem cells can divide indefinitely, scientists are studying if it is feasible for a few cells to redevelop an organ.
- Diseases- Viruses are very tiny germs. They are made of genetic material inside of a protein coating. Viruses cause familiar infectious diseases such as the common cold, flu, and warts. They also cause severe illnesses such as HIV/AIDS, smallpox, and Ebola.
- Invasive Species- When a species is placed in a different ecosystem, it can become known as an invasive species: a species that can take over and damage a different population. For example, the kudzu plant from Asia is overgrowing sections of eastern North America. Kudzu is difficult to eradicate because the root system must be destroyed to kill the plant.

Guid wi	ing / Topical Questions th Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
MS-	What evidence is there that	Students will investigate evidence that living	Phenomena:	Elevate Interactivities:	Open-ended quiz
LS1-1	all living things are made of	things are made of cells and where they come	- The Tough and Tiny Tardigrade	- What All Living	
	cells?	from. Students will also study what living things		Things Have in	Think Pair Share
MS-		need to stay alive, grow, and reproduce.	SEP.2 Developing and Using	Common	
LS1-2	Where do living things		Models	- Mom's Car Must Be	Four corners
	come from?	Students will explore how living things are	Develop and use a model to describe	Alive	
MS-		classified, and how the theory of evolution	the function of a cell as a whole and	- Under the	Science notebooks
LS1-3	What do living things need	supports the classification of organisms.	ways parts of cells contribute to the	Microscope	
	to stay alive, grow and		function.	- Classify It	Discussions/socratic
MS-	reproduce?	Students will investigate the characteristics of		- Bacteriophage	seminars
LS4-2		viruses, bacteria, protists, and fungi, and how	SEP.3 Planning and Carrying Out	Treatments	
	How are living things	these organisms interact with nature and	Investigations	- Vaccine and	Graphic Organizers
9.4.8.	classified into groups?	humans.	Conduct an investigation to provide	Populations	
CT.3			evidence that living things are made of	- Life as a Single Cell	Individual whiteboards
	How does the theory of	Students will investigate the characteristics of	cells; either one cell or many different	- There's Something	
9.4.8.	evolution support the	plants and animals and how these organisms	numbers and types of cells.	Going Around	Lab reports
TL.2	classification of organisms?	interact with nature and humans.		- Discovering	
			SEP.6 Constructing Explanations	Rainforest	open-ended
	What are all living things	CCC.6 Structure and Function	and Designing Solutions	Organisms	questioning
	made of?	Students will determine differences to identify	Apply scientific ideas to construct an	- Modifying a Virus	
		the forms and functions of different plants.	explanation for the anatomical	- Different Cells,	Self assessments
	What are the characteristics		similarities and differences among	Different Jobs	
	of viruses, bacteria, protists,	CCC.7 Stability and Change	modern organisms and between	- Identifying an	Peer assessments
	and fungi?			Organism	

	Students will describe how all organisms must	modern and fossil organisms to infer	- Organization of	Show of hands/3-2-1
How do viruses, bacteria,	maintain a stable internal environment in order	evolutionary relationships.	Organisms	
protists, and fungi interact	to function properly.		- So Many Cells	Exit slips
with nature and people?		SEP.7 Engaging in Argument from		
	Key terms:	Evidence	<u>Hands-On Labs:</u>	Project rubrics
What makes animals and	- organism	Use arguments supported by evidence	- Is It an Animal?	
plants different in form and	- cell	for how the body is a system of	- All Wound Up	Hands-On Labs
function?	- unicellular	interacting subsystems composed of	- Cheek Cells	
	- multicellular	groups of cells.	- Clean Up That Junk	Virtual Labs
Which special structures	- stimulus		Drawer!	
inside plant and animal cells	- response	SEP.8 Obtaining, Evaluating, and	- Living Mysteries	Online webquests
determine an organism's	- spontaneous generation	Communicating Information	- A Mystery	
characteristics?	- homeostasis	Create a field guide of living	Organism No	Topic Enrichments
	- species	organisms. Collect and gather	More!	
How do similar cells work	- classification	information about living organisms,	- Classifying Seeds	Lesson quizzes and
together to help plants and	- genus	evaluate them and place them into	- Viruses by the	unit test
animals function?	- binomial nomenclature	categories or groups based on their	Numbers	
	- taxonomy	characteristics, and communicate	- Life in a Drop of	Lesson checks
Which traits are unique to	- domain	results with the class.	Pond Water	
animals?	- evolution		- Algae and Other	Reading checks
	- convergent evolution		Plants	
	- virus			Scientific arguments
	- host		Engineering Design	(CER)
	- vaccine		Challenge:	
	- bacteria		- Attack of the Viruses	QUEST project "How
	- protist		- A Disease Becomes a	can you design a field
	- parasite		Cure	guide to organize living
	- tissue			things?"
	- vascular plants			
	- nonvascular plants			Performance-Based
	- vertebrates			Assessment "It's
	- invertebrates			Alive!" - Students will
	- organ			observe several
	- mammals			different types of living
				things and gather
				evidence to distinguish
				living things from
				nonliving things.

General Differentiated Instruction Strategies				
 Leveled texts Chunking texts Choice board Socratic Seminar Tiered Instruction Small group instruction Guided Reading 	 Repeat, reword directions Brain breaks and movement breaks Brief and concrete directions Checklists for tasks Graphic organizers Assistive technology (spell check, voice to type) Study guides 			
 Guided Reading Sentence starters/frames Writing scaffolds Tangible items/pictures Adjust length of assignment 	 Study guides Tiered learning stations Tiered questioning Data-driven student partnerships Extra time 			

Possible Additional Strategies for Special Education Students, 504 Students, At-Risk Students, and English Language Learners (ELLs)				
Time/General	Processing	Comprehension	Recall	
 Extra time for assigned tasks Adjust length of assignment Timeline with due dates for reports and projects Communication system between home and school Provide lecture notes/outline 	 Extra Response time Have students verbalize steps Repeat, clarify or reword directions Mini-breaks between tasks Provide a warning for transitions Reading partners 	 Precise step-by-step directions Short manageable tasks Brief and concrete directions Provide immediate feedback Small group instruction Emphasize multi-sensory learning 	 Teacher-made checklist Use visual graphic organizers Reference resources to promote independence Visual and verbal reminders Graphic organizers 	
Assistive Technology	Assessments and Grading	Behavior/Attention	Organization	

 Computer/whiteboard Tape recorder Spell-checker Audio-taped books Extended time Study guides Shortened tests Read directions aloud 	 Consistent daily structured routine Simple and clear classroom rules Frequent feedback 	 Individual daily planner Display a written agenda Note-taking assistance Color code materials
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Enrichment				
he goal of Enrichment is to provide learners with the opportunity to participate in extension activities that are differentiated and enhance the arriculum. All enrichment decisions will be based upon individual student needs.				
 Show a high degree of intellectual, creative and/or artistic ability and demonstrate this ability in multiple ways. Pose questions and exhibit sincere curiosity about principles and how things work. The ability to grasp concepts and make real world and cross-curricular connections. Generate theories and hypotheses and pursue methods of inquiry. Produce products that express insight, creativity, and excellence. Possess exceptional leadership skills. Evaluate vocabulary Elevate Text Complexity Inquiry based assignments and projects Independent student options Tiered/Multi-level activities Purposeful Learning Center Open-ended activities and projects Form and build on learning communities Providing pupils with experiences outside the 'regular' curriculum 				
 Altering the pace the student uses to cover regular curriculum in order to explore topics of interestin greater depth/breadth within their own grade level A higher quality of work than the norm for the given age group. The promotion of a higher level of thinking and makingconnections. The inclusion of additional subject areas and/or activities (cross-curricular). Using supplementary materials in addition to the normal range of resources. 				

English Language Learner (ELL) Resources

- Learning style quiz for students- http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml
- "Word clouds" from text that you provide-http://www.wordle.net/
- Bilingual website for students, parents and educators: http://www.colorincolorado.org/
- Learn a language for FREE-www.Duolingo.com
- Time on task for students-http://www.online-stopwatch.com/
- Differentiation activities for students based on their Lexile-www.Mobymax.com
- WIDA-http://www.wida.us/
- Everything ESL http://www.everythingESL.net
- ELL Tool Box Suggestion Site http://www.wallwisher.com/wall/elltoolbox
- Hope4Education http://www.hope4education.com
- Learning the Language http://blogs.edweek.org/edweek/learning-the-language/
- FLENJ (Foreign Language Educators of NJ) 'E-Verse' wiki: http://www.flenj.org/Publications/?page=135
- OELA http://www.ed.gov/offices/OBEMLA
- New Jersey Department of Education-Bilingual Education information http://www.state.nj.us/education/bilingual/

Special Education Resources

- Animoto -Animoto provides tools for making videos by using animation to pull together a series of images and combining them with audio. Animoto videos or presentations are easy to publish and share. https://animoto.com
- Bookbuilder -Use this site to create, share, publish, and read digital books that engage and support diverse learners according to their individual needs, interests, and skills. http://bookbuilder.cast.org/
- CAST -CAST is a non-profit research and development organization dedicated to Universal Design for Learning (UDL). UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. http://www.cast.org
- CoSketch -CoSketch is a multi-user online whiteboard designed to give you the ability to quickly visualize and share your ideas as images. http://www.cosketch.com/
- Crayon -The Crayon.net site offers an electronic template for students to create their own newspapers. The site allows you to bring multiple sources together, thus creating an individualized and customized newspaper. http://crayon.net/ Education Oasis -Education Oasis offers a collection of graphic organizers to help students organize and retain knowledge cause and effect, character and story, compare and

contrast, and more! http://www.educationoasis.com/printables/graphic-organizers/

- Edutopia -A comprehensive website and online community that increases knowledge, sharing, and adoption of what works in K-12 education. We emphasize core strategies: project-based learning, comprehensive assessment, integrated studies, social and emotional learning, educational leadership and teacher development, and technology integration. http://www.edutopia.org/
- Glogster -Glogster allows you to create "interactive posters" to communicate ideas. Students can embed media links, sound, and video, and then share their posters with friends. http://edu.glogster.com/?ref=personal
- Interactives Elements of a Story -This interactive breaks down the important elements of a story. Students go through the series of steps for constructing a story including: Setting, Characters, Sequence, Exposition, Conflict, Climax, and Resolution. http://www.learner.org/interactives/story/index.html
- National Writing Project (NWP) -Unique in breadth and scale, the NWP is a network of sites anchored at colleges and universities and serving teachers across disciplines and at all levels, from early childhood through university. We provide professional development, develop resources, generate research, and act on knowledge to improve the teaching of writing and learning in schools and communities. http://www.nwp.org
- Pacecar -Vocab Ahead offers videos that give an active demonstration of vocabulary with audio repeating the pronunciation, definition, various uses, and synonyms. Students can also go through flash cards which give a written definition and visual representation of the word. http://pacecar.missingmethod.com/