Englewood Public School District
Science
Grade 4
First Marking Period

Unit 1: Weathering and Erosion

Overview: In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. The crosscutting concepts of patterns and cause and effect are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on 4-ESS2-1 and 4-ESS1-1.

Time Frame: 10 – 15 days

Enduring Understandings:
Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
Rainfall helps to shape the land and affects the types of living things found in a region.
Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.
The presence and location of certain fossil types indicate the order in which rock layers were formed.

Essential Questions:
How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?
What can rock formations tell us about the past?

Standards	Topics and Objectives	Activities	Resources	Assessment
4-ESS1-1 **Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.** **4-ESS2-1** **Make observations and/or measurements to provide evidence of the effects of weathering or the rate of**	**Topics** Weathering and Erosion Twenty-First Century Themes and Skills include: Environmental Literacy • The Four C's • Environmental Literacy • Global Awareness **Objectives** Explain how the processes of	**Erosion:** **Activity 1:** The students will be in small groups and will follow steps to model wind and water erosion. Students will draw diagrams and make observations in their science notebook. Students will then add a piece of sod to see how that impacts the wind and water erosion on their soil. (MP.4)	**Erosion:** Clear plastic box (for each group) to make an erosion tray • Syringes • Spray bottles • Sand • Small rocks • Piece of sod • Student Log: Erosion (PDF) • Worksheet: What is Erosion? (PDF) **Books:**	**Formative Assessments:** Students will collect and record data in science journals and analyze the data to identify patterns of change. **Weathering:** Student Weathering Classification **Benchmark Assessment:**

erosion by water, ice, wind, or vegetation.	weathering and erosion change and move materials that become soil. **Weathering:** Students will understand 4 types of weather processes: wind, running water, plant growth, and freezing water. **Weathering and Erosion Splashdown:** Students will investigate how the roots of a plant can help slow the erosion process. **Fun With Fossils:** Students will examine how fossils are formed and understand how fossils provide evidence of plants and animals that lived long ago as well as the environmental conditions at that time. **Fossil Inferences:** Students will be able to place fossils in order based on geologic age of rock they are found in.	**Activity 2:** Students will walk around the school and take pictures and/or draw areas that are experiencing erosion. Have them make observations in their science journals. **Weathering:** **Activity 1** - Wind as an agent of weathering 1. Give groups of students a cup half-filled with salt and a colored piece of chalk. Have them take turns stirring the colored chalk through the salt. 2. Two things will happen: the salt will be colored and the chalk piece will wear away. Relate this to wind blowing sand on rocks and wearing them away like the formations seen southern Utah. (Instead of wind blowing sand against Arches, tell them the chalk represents Arches and they are moving Arches through the sand.) **Activity 2** - Running water as an agent of weathering 1. Compare river rocks with sharp-edged rocks. Rub two pieces of sandstone together and notice the pile of sand that collects. 2. Fill the plastic bottle 3/4 full of water. 3. Drop in three or four small pieces of sandstone. 4. Make sure the top is	• Geology Rocks by Cindy Blobaum (Williamson Publishing Co.), 1999 • Dirt: Secrets in the Soil by Debra Speilmaker (Utah State University) **Weathering Videos:** • Bill Nye Video, Erosion. The "Rocks and Soil" episode also has a very good segment on weathering. • Dirt: Secrets in the Soil: The first segment after the introduction talks about how long it takes to form a layer of topsoil. After the words "Nitty-gritty," there is a five-minute segment that specifically talks about how rocks are broken down by water, roots, and chemicals. **Weathering and Erosion Splashdown:** **Video:** https://www.youtube.com/watch?v=im4HVXMGI68 https://www.youtube.com/watch?v=-EMqRjvMk2A https://printableworksheets.in/worksheet/bill-nye-rocks-and-soil **Bill Nye Video-Erosion** **Gary's Sand Journal** **Explaining Glaciers,**	Exact Path **Summative Assessments:** **Erosion:** Science Journals Student Log **Weathering and Erosion Splashdown:** Student science journal 2 examples of how plants slow erosion. **Fossil Inferences:** Students paragraph on Law on Superposition **Alternative Assessments:** Students will identify, test, and use cause-and-effect relationships in order to explain change. Learning/Response Logs Students will make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. Questioning Discussion Students are expected to use mathematics when analyzing quantitative data to identify

		screwed on tightly. Have students observe the clean, clear water, and the shape of the rocks. 5. Shake bottle vigorously for three minutes. 6. Examine water. Take stones out. Observe the weathering (rounded edges). (4.MD.A.1) **Activity 3** - Plant growth as an agent of weathering 1. Explain that Plaster of Paris hardens and will represent rocks in this demonstration. Mix the Plaster of Paris quite well and pour into a disposable 16 oz. cup. "Plant" several bean seeds in the wet mix so that some are covered and are just below the surface and the others are resting on the surface (about half submerged). 2. Assign a student to keep a wet folded paper towel on top of the cup. It must be moistened every day. (Soaking the seeds ahead of time will hasten their growth.) 3. Ask students to predict what will happen to the seeds. Record predictions and subsequent observations in their science log. 4. Over the course of two to three weeks you will see the seeds sprout. As they do, small fragments or flakes of the Plaster of	**Accurately** **Coastal Erosion** **Websites:** http://teacher.scholastic.com/dirtrep/erosion/index.htm **Materials:** • Splashdown Target (pdf) • Soil • Pipettes • Cups for water • Tally sheet • Ruler • Grass plugs **Fun with Fossils:** **Multimedia Resources:** • Becoming a Fossil QuickTime Video • How a Dinosaur Became a Fossil Flash Interactive • Laetoli Footprints QuickTime Video • Fossils Flash Image • Fossils: An Ancient Sea in Indiana Flash Interactive • The Grand Canyon: Evidence of Earth's Past QuickTime Video • Types of Fossils Flash Interactive Internet access for each pair of students For each student: • Paper plate • Plaster of Paris (enough to fill plate) • Natural object that can be used for making a fossil	patterns, explain cause-and-effect relationships, and make predictions. Meaningful Homework/Assignments Students will take notes, to help them understand and explain how earth processes affect the world around them. Graphic Organizers Students will attempt to answer questions, and cite evidence from observations and from texts to support their thinking. Self-Assessments Multiple Choice Students will conduct short research projects that will help them gather additional evidence to support explanations. Research Reports Data Charts, Graphs

		Paris will break away. These flakes represent rock flakes broken away from large rocks as plants take root and grow on them. (MP.5, 6.1.4.B.4) **<u>Activity 4</u>** - Freezing water as an agent of weathering 1. Wet a chunk of clay about the size of a grapefruit. Roll it into a ball. 2. Place the ball in a plastic bag and put it in the freezer. Leave it overnight. 3. Next day, removed the clay from the freezer. Its surface should be slightly cracked and broken. Ask students to record their observations. 4. Wet the clay again, taking care not to close up the cracks that have been formed. Put it back into the freezer for another night. 5. On the following day, take it out and have students observe what has happened to the cracks. Measure the cracks. You could repeat this process several more times, watching the cracks widen. Discuss how this relates to the breaking down of rocks on a larger scale. Compare this to autumn rains filling cracks in the rocks (and sidewalks) then freezing during the winter.	(Note: See description in Before the Lesson.) • Doll (optional) • Earth materials (optional) • Cardboard box (optional) **<u>Fossil Inferences:</u>** • Pencils • Colored Pencils • Drawing Paper, • Cardstock • Handouts: • *<u>Nonsense Cards Set A</u>*, • *<u>Fossils Cards Set B (1)</u>*, • *<u>Fossils Cards Set B (2)</u>*, • *<u>Stratigraphic Section for Set B</u>*, • *Fossil Map of Utah* **<u>Additional Resources Books</u>** • The Amazing Earth Model Book, Donald M. Silver & Patricia J. Wynne, ISBN # 0-590-93089-3 • *The Big Beast Book*, Jerry Booth, ISBN #0-316-10266-0 • *Dinosaur-The story behind the scenery*, Allan Hagood, ISBN # 0-916122-10-7 • *Dinosaurs of Utah and Dino Destinations*, Pat Bagley and Gayle Wharton, ISBN #1566846013 • *The Dinosaur Alphabet Book*, Jerry Pallotta • *Everything You Need to Know About Science*,	

		(MP.4, 8.1.5.A.3) **Weathering and Erosion Splashdown:** Students will work in small groups. Students will place a soil sample in the center of the Splashdown Target. Then using a dropper or pipette the students will drop water on the soil sample and record the results. Each student in the group will drop the water on the area. Students will then repeat this process using a grass plug and record the results. (CRP6, 9.1.4.A.2) **Fun with Fossils:** **Part 1:** Students will create their own fossils to explore how fossils may form. (W.4.7,MP.2) **Part 2:** Students will view different fossils and discuss whether they are plant or animal and what they may tell us. Students will then work in pairs to create a presentation based on a fossil and scenario. (W.4.9, 4.MD.A.2, CRP4) **Fossil Inferences:** **Part1**: Students will sort through "non-sense" cards to put them in time order based on oldest rock layers. **Part 2:** Students will then match cards of fossils based on the rock formation.	Anne Zeman and Kate Kelly, ISBN # 0-590-49357-4 • *Eyewitness Books, Fossil*, Dr. Paul D. Taylor, ISBN # 0-7566-0682-9 • *Eyewitness Books, Rocks and Minerals*, Dr. R.F. Symes ISBN #0-7894-5805-5 • *The Extinct Alphabet*, Jerry Pallotta, ISBN # 088106-471-8 • *The Fossil Factory*, Douglas, Niles, and Gregory Eldredge, ISBN #1-57098-417-4 • *Kingfisher Young Knowledge, Rocks and Fossils*, Chris Pellant ISBN, #0-7534-5619-2 • *Reader's Digest, Pathfinders, Dinosaurs*, Paul Willis, ISBN # 0-7944-0001-9 **Videos** • https://www.neok12.com/Fossils.htm • https://www.youtube.com/watch?v=xAb5ECg3g0M • https://www.dailymotion.com/video/x2nmirr	

		(W.4.8, CRP8)		

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning.
The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity
In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
• Provide a computer for written work • Speak and display terminology • Teacher modeling • Peer modeling • Provide ELL students with multiple literacy strategies. • Word walls • Use peer readers • Give page numbers to help the students find	• Provide a computer for written work • Utilize modifications & accommodations delineated in the student's IEP • Work with paraprofessional • Use multi-sensory teaching approaches. • Work with a partner • Provide concrete examples	• Provide a computer for written work • Using visual demonstrations, illustrations, and models • Give directions/instructions verbally and in simple written format. Oral prompts can be given. • Peer Support • Increase one on one	• Curriculum compacting • Inquiry-based instruction • Independent study • Higher order thinking skills • Adjusting the pace of lessons • Interest based content • Real world scenarios • Student Driven Instruction • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.

answers ● Provide two sets of textbooks, one for home and one for school ● Provide visual aides ● Provide additional time to complete a task ● Use graphic organizers	● Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	time ● Teachers may modify instructions by modeling what the student is expected to do ● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. ● Review behavior expectations and make adjustments for personal space or other behaviors as needed. ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal	● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Collaborate with after-school programs or clubs to extend learning opportunities.

		articles, and biographies).	

Interdisciplinary Connections:

ELA-NJSLS/ELA:
W.4.7: Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1)
W.4.8: Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS2-1), (4-ESS1-1)
W.4.9: Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)

Mathematics:
MP.5: Use appropriate tools strategically. (4-ESS1-2)
MP.2: Reason abstractly and quantitatively. (4-ESS1-1)
MP.4: Model with mathematics. (4-ESS1-1)
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1)
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1), (4-ESS2-2)

Integration of 21st Century Learners:
9.1.4.A.2: Evaluate available resources that can assist in solving problems.

Career Ready Practices:
CRP6: Demonstrate creativity and innovation**.**
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Technology Standards NJSLS 8:
8.1.5.A.3: Use a graphic organizer to organize information about a problem or issue.

Social Studies:
6.1.4.B.4: 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.

Key Vocabulary:
Weathering: the process by which larger rocks crack and break apart over time to form smaller rocks.
Soil: a mix of humus, sand, silt, clay, gravel, and/or pebbles
Wind: a natural movement of air
Water: the clear liquid that has no color, taste, or smell, that falls from clouds as rain, that forms streams, lakes, and seas,
Vegetation: plants that cover a particular area
Fossil: any remains, trace, or imprint of animal or plant life preserved in Earth's crust
Sedimentary Rock: formed by sediment that is deposited over time, usually as layers at the bottom of lakes and oceans**.**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1) **Constructing Explanations and Designing Solutions** .	**ESS2.A: Earth Materials and Systems** • Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) **ESS2.E: Biogeology**	**Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1) **Patterns** • Patterns can be used as evidence to support an explanation. (4-ESS1-1) -

• Identify the evidence that supports particular points in an explanation. (4-ESS1-1)	• Living things affect the physical characteristics of their regions. (4-ESS2-1) **<u>ESS1.C: The History of Planet Earth</u>** • Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	- - - - - ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes consistent patterns in natural systems. (4-ESS1-1)

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Unit 2: Earth Processes

Overview: In this unit of study, students apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps. The crosscutting concepts of *patterns*, *cause and effect*, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.
This unit is based on 4-ESS2-2, 4-ESS3-2, 3-5-ETS1-2, and 3-5-ETS1-3.

Time Frame: 10 – 15 days

Enduring Understandings:
Maps can help locate the different land and water features of Earth.
The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns.
A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions).
Humans cannot eliminate the hazards, but they can take steps to reduce their impacts.

Essential Questions:
What can maps tell us about the features of the world?
In what ways can the impacts of natural Earth processes on humans be reduced?

Standards	Topics and Objectives	Activities	Resources	Assessments
4-ESS2-2. **Analyze and interpret data from maps to describe patterns of Earth's features.** **4-ESS3-2.** **Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.**	**Topics** Earth Processes Twenty-First Century Themes and Skills include: Environmental Literacy • The Four C's • Environmental Literacy • Global Awareness	**Engineering for the 3 Little Pigs:** **Part 1:** Students construct buildings following the construction guidelines. (4 days in advance) **Part 2:** Students will test the buildings they built using water and bricks. Students will test each building and	**Engineering for the 3 Little Pigs:** Each group needs: • 6 bathroom-sized paper cups ("Dixie" cups) • 1 small bowl for mixing ingredients • 4 cups of sand • 5 tsp. white glue • 1 cup water • 2 plastic spoons (about	**Formative Assessments:** **Model of a Normal Fault:** Measurements of Model movement **Earthquakes – Engineering:** Liquefaction Sketch Science Journal – experimentation process

3-5-ETS1-3 **Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**	**Objectives** **Engineering for the 3 Little Pigs** Students will explain that combining different materials is necessary when using rocks, soils and minerals for construction. Students will explain how engineers need to consider material properties of rocks, soils and minerals when creating something new. **Earthquake in the Classroom:** Students will **i**dentify some of the factors that make buildings earthquake-proof, including cross bracing, large "footprints," and tapered geometry. Students will model an earthquake-proof structure using simple materials. **Model of a Normal Fault:** Students will model the movement of a normal fault. **Earthquakes - Engineering** Students will demonstrate how buildings built on loose sediment and sediment saturated with water can be structurally unsound during an earthquake.	record observations. Using their information they will perform a cost analysis and decide which building would be the safest and most cost efficient to live in. (MP.5, MP.4, 4.MD.A.2, 4.OA.A.1, CRP6, CRP8, W.4.7) **Earthquake in the Classroom:** **Part 1** Students will experiment building with marshmallows and toothpicks. The teacher will display a sample building for the students to look at. As a class discuss, different building techniques. Students will then construct their buildings with the given materials only. (MP.2, RI.4.7, 8.1.5.A.3) **Part 2:** Students will test their structures in the earthquake pan. Students will record their observations, make adjustments on their buildings and retest to make the strongest building possible. **Part 3:** Students draw and label a diagram of their final building. They will create a flyer to convince their company to allow them to build their building. **Model of a Normal Fault:** Students will build models of normal fault and will investigate how the faults move and what happens in	teaspoon-sized) To share with the entire class: • 1 permanent marker, any color • 1 watering can • A few bricks • 1 can of non-stick cooking spray • Safety glasses **Earthquake in the Classroom** For each student: • 30 toothpicks • 30 miniature marshmallows • Earthquake Journal For the entire class to share: • Eight 8½-inch square disposable baking dishes, or one 8½ x 11-inch disposable roasting or baking pan • 8 boxes Jell-O® (plus a stove, water and pan to make the Jell-O® in advance) **Model of a Normal Fault** • Photocopies of models • Scissors • Glue **Earthquake Engineering** • Buckets • Sand • Rubber mallets • Water • Beakers (1000 ml) • Bricks **Resources:**	**Benchmark Assessments:** Exact Path **Summative Assessments:** **Engineering for the 3 Little Pigs** Student Science Journal Cost Analysis **Earthquake in the Classroom** Student Final Building Student Flyer **Earthquakes – Engineering:** Poster Student Essay - Argument for or against building on unstable soil. **Additional Assessments:** Students will use measurements to determine how far earthquakes and volcanoes tend to occur from continental boundaries. Charts, diagrams Students will analyze data to determine patterns of change that occur in areas where volcanoes erupt, earthquakes occur, and in flood zones. Visual Thinking Strategies Students will reason abstractly and quantitatively to draw diagrams to build scale

		response to that movement. **<u>Earthquakes Engineering:</u>** **Part 1:** Students watch a video on the Loma Prita Earthquake and discuss why they think there was so much damage. **Part 2:** Students create a contour map of areas around the Loma Prita epicenter. Students will then test a sandy foundation during and earthquake. (6.1.4.B.7) **Part 3**: Students will investigate the liquefaction of sand and watch a short video on a Japanese earthquake. **Part 4:** Students will experiment with a variety of loose soils and decide how to stabilize them. (CRP4, RI.4.1, RI.4.9, 9.1.4.A.2)	• Experimental methods (pg. 35) http://www.ce.memphis.edu/7137/PDFs/Reference2/Seed%20et%20al.pdf • Contour map http://crack.seismo.unr.edu/ftp/pub/louie/class/100/mercalli.html • Liquefaction experiment http://www.exploratorium.edu/faultline/activezone/liquefaction.html **Videos:** • 2011 Japan Earthquake • Loma Pita Earthquake **<u>Additional Resources:</u>** https://www.sciencea-z.com/main/UnitResource/unit/65/earth-space-science/grades-5-6/changing-landforms https://quizlet.com/2002063/5th-grade-chapter-10-protecting-earths-resources-flash-cards/	models. Project-based/Inquiry learning Students will analyze constraints on materials, time, or cost to in order to determine criteria for design solutions. Simulations/Business games Students need opportunities to conduct research to build their understanding of how earth processes affect humans and to find examples of ways in which engineers reduce the effect of volcanic eruptions, earthquakes, floods, and tsunamis. Written questions/Exercises

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all
instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be reviewed
to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity in
planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	**Special Education**	**At-Risk**	**Gifted and Talented**
● Provide additional time to complete a task ● Speak and display terminology ● Teacher modeling ● Peer modeling ● Provide ELL students with multiple literacy strategies. ● Word walls ● Use peer readers ● Give page numbers to help the students find answers ● Provide a computer for	● Provide additional time to complete a task ● Utilize modifications & accommodations delineated in the student's IEP ● Work with paraprofessional ● Use multi-sensory teaching approaches. ● Work with a partner ● Provide concrete examples ● Restructure lesson using UDL principals	● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Using visual demonstrations, illustrations, and models ● Give directions/instructions verbally and in simple written format. Oral prompts can be given. ● Peer Support ● Increase one on one time ● Teachers may modify instructions by modeling what the student is expected to do	● Inquiry-based instruction ● Independent study ● Higher order thinking skills ● Adjusting the pace of lessons ● Interest based content ● Real world scenarios ● Student Driven Instruction ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understand -ings. ● Use project-based science learning to connect science

written work ● Provide two sets of textbooks, one for home and one for school ● Provide visual aides ● Use graphic organizers	(http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. ● Review behavior expectations and make adjustments for personal space or other behaviors as needed. ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).	with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Collaborate with after-school programs or clubs to extend learning opportunities.

Interdisciplinary Connections:

ELA-NJSLS/ELA:
RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2)
RI.4.7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)
W.4.7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)
RI.4.9: Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2)

Mathematics:
MP.2: Model with mathematics. (4-ESS1-2)
MP.5: Use appropriate tools strategically. (4-ESS1-2)
MP.4: Reason abstractly and quantitatively. (4-ETS1-1)
4.OA.A.1: Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-2)
4.MD.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 4-ESS2-2)

Career Ready Practices:
CRP6: Demonstrate creativity and innovation**.**
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Technology Standards NJSLS 8:
8.1.5.A.3: Use a graphic organizer to organize information about a problem or issue.

Integration of 21st Century Learners:
9.1.4.A.2: Evaluate available resources that can assist in solving problems.

Social Studies:
6.1.4.B.7: Explain why some locations in New Jersey and the United States are more suited for settlement than others.

Key Vocabulary:
Earthquakes: when the ground shakes or moves suddenly due to the release of built up stress within the Earth's crust or upper mantle; occurs along plate boundaries
Seismology: the study of earthquakes
Fault: a break in the earth's crust either within a plate or between plates

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2) **Constructing Explanations and Designing Solutions** • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2),(3-5-ETS1-2) **Planning and Carrying Out Investigations**	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** • The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2) **ESS3.B: Natural Hazards**	**Patterns** • Patterns can be used as evidence to support an explanation. (4-ESS2-2) **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2) - ***Connections to Engineering, Technology, and Applications of Science***

	• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)	• A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) *(Note: This Disciplinary Core Idea can also be found in 3.WC.)* **ETS1.B: Designing Solutions to Engineering Problems** • Testing a solution involves investigating how well it performs under a range of likely conditions. *(secondary to 4-ESS3-2*) **ETS1.B: Developing Possible Solutions** • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) **ETS1.C: Optimizing the Design Solution** • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)	**Influence of Engineering, Technology, and Science on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2) • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)	