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Geology and Me! Unit Plan
Lessons

Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#1 / #1-2	Layers of Earth / MCM	Students are introduced to the earth's layers. They will learn about the compositions of the crust, mantle, outer and inner core. • Students will discuss what they think the inside of the earth looks like. • The teacher will read the *Magic School Bus: Inside the Earth* to introduce concepts that will be presented throughout the unit. • The teacher will show a model of the earth without explanation. Students will be expected to write about the model explaining how each layer is represented. • Students will read and fill out notes on *Journey to the Center of the Earth* page to highlight major characteristics of each layer. • Students will decide how they would make a model of the earth using materials with the same consistency (ex: mantle needs to be taffy-like)	**Elicits** student ideas regarding their previous knowledge about the earth's layers. **Engages** students with a snapshot of material covered throughout the unit. Adaptations: *Journey to the Center of the Earth* student page will be modified. Students with special needs will receive a copy with notes already filled in. The students will be expected to highlight those notes. Assessment: Observations of class discussions. Essential Questions: What do you think the inside of the earth looks like? How would you compare the textures of the different layers of earth? How is the core/mantle/crust layer different from the others?

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#2 / #3	Earth's Crust/CMC	Students view Bill Nye's "Earth's Crust" video to learn about plate movement and how it affects surface features on the earth's crust. • Students will use the anticipation guide before and after viewing the video as an assessment of knowledge • Students will view the Bill Nye "Earth's Crust" video while using the student page to highlight important information to remember. • From the video, students will learn about plate movement and how earth's surface features form. • Homework: With a parent, read and highlight *Continental Drift Theory* (front and back). Be prepared to discuss big ideas next class.	**Engages** students through the video and the anticipation guide. Students will be curious about the earth's crust. The anticipation guide will probe understanding. Adaptations: One student who has difficulty seeing will need his seat moved to better view the video. Assessment: Pre-assessment/Post-assessment of knowledge on earth's layers. Students will submit a reflection piece on the back of their video component explaining cause and effects of plate tectonics. Essential Questions: Why is the earth's crust important? Explain why we need to know about plate tectonics. How do plates move? What happens when plates move?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#3/ #4-5	Continental Drift Theory/O	Students will experience the Continental Drift Theory through manipulating puzzle pieces of the continents, reading an excerpt, and writing a letter to Alfred Wegener. • Students will put together the Pangaea puzzle of the earth without instruction. • Students will read and discuss *The Continental Drift Theory* (front and back) with a buddy to understand that plates may have once been united into one super- continent called Pangaea. • Students will hypothesize how plates move. • Teacher will conduct an experiment using hot water, ice cubes, and tab water to explain that molten rock in the mantle is heated by the core, then rises, and as it cools falls back toward the core. This is a continuous cycle called convection currents. • The teacher will lead students through the *Cracked Crust* activity pointing out specific scientific evidence, such as fern-fossils, as evidence to prove Alfred Wegener's Continental Drift Theory.	Students will **explore** by analyzing data and giving evidence to agree/disagree with Wegener's Continental Drift Theory. Adaptations: Students will be grouped according to varying reading abilities. Assessment: Monitor students while completing the puzzle, note taking, and completing the activity. Discussion of Pangaea and continental drift theory. Essential Questions: Do you agree/disagree with Wegener? What other evidence could explain Wegener's theory? How do you think plates move? How does the convention current cycle relate to what we know about hot air/cold air?

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Activity #/ Day #	**Title/Label**	**Short Description**	**Function/Rationale**
#4 / #6	Moving Machine (Convection Currents)/O	Students are going to complete a series of activities that model how volcanoes, earthquakes, rifts, and mountains are formed at the edge of plate boundaries. • Students will use the anticipation guide before and after completing the plate movement lab as an assessment of knowledge • The teacher will explode a clay volcano using vinegar and baking soda. Students will be expected to draw and label a picture before and after the lab explaining how this happens in the real world. • The teacher will explain to students how materials represent real-life objects. (graham crackers=plates, frosting=molten rock, force=convection currents) • Throughout the lab, students will learn about divergent, convergent, and transform boundaries and how they effect changes on the earth's surface while manipulating graham crackers in small groups. • The students will summarize their learning of plate movement by categorizing the name of the boundary, direction, and surface outcomes.	Students will **explore** plate movement patterns. Adaptations: Students will be grouped by varying ability levels. Assessment: Discussion, pre-assessment/post-assessment statements, predictions, going back and changing ideas, drawing several pictures of an experience. Essential Questions: What do you think this model of plate movement represents? (What does the graham cracker represent? Frosting? Wax paper?) What could be the outcome (real world examples) of two plates sliding underneath one another? Pushing together? Pushing apart?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#5 / #7-8	*Science Seekers Part 1*: How does uplift change Earth's surface? / MCM	Students apply their knowledge of plate movement to assist investigation of the *Science Seekers* question, "What location would fossils most likely be found at?" • Students will watch Science Seekers CD-ROM for introduction of the problem to be solved (What location would fossils most likely be found at?) • Students will read and take notes on their page which reviews the earth's interior, plate tectonics, volcanoes, faulting and folding, and plate boundaries. • Students will re-teach their information with group members (members should take notes) • The teacher will remind students about plate movement lab conducted in the previous lesson pointing out the four ways that plates can move. • Students will answer questions regarding material read in teams prompted by the CD-ROM.	Students will **explain** how plates move creating volcanoes, faulting and folding at plate boundaries. Adaptations: Groups will be created by the teacher according to varying ability levels. Special needs students will all be given the same letter sheet so the special education teacher can assist outside of the science classroom. Assessment: Monitoring while students take notes and discuss with group members. Posing probing questions to groups for further understanding. Students will submit their post-observation questions explaining plate movement. Essential Questions: What is one type of boundary where volcanoes might form? How do mountain ranges form? What causes rock to fault or fold?

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#6 / #9	The Rock Cycle MSTA Crayon Activity- Sediments/ CM	Students will use crayon shavings to model weathering of rock and relate it to this process in the rock cycle. Students will identify the crayon shavings as sediments and the sharpener as an agent of weathering, such as water and wind. They will discuss examples of actual weathering effects and identify where this process occurs in the natural world. They reflect on what they have learned: Weathering breaks down rock into smaller pieces. Wind, water, ice, humans, animals, plants, and gravity can weather rock. The sediments later form new rock.	Students **explore** mechanical weathering through the crayon activity. Adaptations: Students who finish early read an introduction to rocks and highlight key information to gain a better understanding. Students will be grouped by varying ability levels. Assessment: Students will answer questions that check their understanding on what the materials in the activity represent and where weathering occurs in the real world. Informal observations of students' participation and understanding. Essential Questions: What do the crayon shavings represent? What does the sharpener represent? What are some of nature's forces that wear down or weather rocks?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#7 / #10	The Rock Cycle MSTA Crayon Activity- Sedimentary Rock/ CM	Students will apply pressure to different colored crayon shavings layered on top of one another to model the formation of sedimentary rock. They will identify how and where this process happens in the natural world and how it relates to the rock cycle.	Students **explore** the formation of sedimentary rocks through the crayon activity. Adaptations: As students finish, they may complete worksheet on the formation and characteristics of sedimentary rocks. Students will be grouped by varying ability levels. Assessment: Students will answer questions that check their understanding on how sedimentary rocks are formed and what natural activities break down rocks. Informal observations of students' participation and understanding. Essential Questions: What kind of rock did you make when you put pressure on the shavings? What happened to the space between the shavings, and what would have filled the spaces between the sediments in real life? Where is sedimentary rock found? What natural activities work to break down rock? Where do sedimentary rocks form?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#8 / #11	The Rock Cycle MSTA Crayon Activity- Metamorphic Rock/ CM	Students will use heat (toaster ovens) and pressure (vices) to model the formation of sedimentary rock into metamorphic rock. They will identify how and where this process happens in the natural world and how it relates to the rock cycle. Students will predict what would happen if more pressure was applied to the rock.	Students **explore** the formation of metamorphic rocks through the crayon activity. Adaptations: Read and highlight key information on metamorphic rocks, and then answer comprehension questions if finished early. Students will be grouped by varying ability levels. Assessment: Students will answer questions that check their understanding on how metamorphic rocks are formed. Informal observations of students' participation and understanding. Essential Questions: What is the difference between this rock and the piece you observed before it was put in the vice and an oven? What does metamorphosis mean? What earth forces cause metamorphic rocks to form? What are some examples of metamorphic rocks?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#9 / #12	The Rock Cycle MSTA Crayon Activity- Igneous Rock/ CM	Students will model the formation of igneous rock by melting crayon representations of rock and sediment into magma (melted crayon), and then setting the magma to cool over different surfaces. Students will predict how the texture of igneous rock will change depending on the surface on which it cools, and then verify their predictions after observing the cooled magma. Students will learn the difference between magma and lava and its relationship to igneous rocks. They will identify how and where this process happens in the natural world and how it relates to the rock cycle.	Students **explore** the formation of igneous rocks through the crayon activity. Adaptations: Students that finish early may read about the formation and characteristics of igneous rocks. Students will be grouped by varying ability levels. Assessment: Students will answer questions that check their understanding on how igneous rocks are formed and how the appearance depends on where it cools. Informal observations of students' participation and understanding. Essential Questions: What "real life" situation does this activity represent? How is igneous rock formed? How does the rate of cooling affect the type of igneous rock formed? Why would lava cool more quickly than magma?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#10 / #13	The Rock Cycle MSTA Crayon Activity- Rock Cycle Diagram	Students will construct a diagram of the rock cycle using crayon samples, which represent sediments and sedimentary, metamorphic, and igneous rocks. Students will review the processes that create each type of rock, and include these in their rock cycle diagrams. They will discuss how each type of rock can change into either of the other types of rock, and how the rock cycle is a continuous cycle.	Students **apply** knowledge of the relationships between the different types of rocks to form a diagram of the rock cycle. Adaptations: Students that finish early complete worksheet on the rock cycle to deepen understanding. Students will be grouped by varying ability levels. Assessment: Students will make a rock cycle using their crayon samples, correctly labeling each of the three types of rocks and the processes that turn each type into the others. Essential Questions: What are the three types of rocks in the rock cycle? How do sedimentary/metamorphic/igneous rocks move through the rock cycle? What causes one rock type to change into another?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#11 / #14-15	*Science Seekers Part 2*: Which rocks contain fossils? / MCM	Students apply their knowledge of the rock cycle to assist investigation of the *Science Seekers* question, "What location would fossils most likely be found at?" • Students will watch Science Seekers CD-ROM for introduction of the problem to be solved (What location would fossils most likely be found?) • Students will read and take notes on their page, which reviews how the different types of rocks are formed, where the different types of rocks are located, and what happens to fossils during rock formation. • Students will re-teach their information with group members (members should take notes) • The teacher will remind students about the rock cycle lab conducted throughout the past week with crayons pointing out the processes rocks go through when they change. • Students will answer questions regarding material read in teams prompted by the CD-ROM.	Students will **explain** how sedimentary, metamorphic, and igneous rocks are formed and where they are most often found. Adaptations: Groups will be created by the teacher according to varying ability levels. Special needs students will all be given the same letter sheet so the special education teacher can assist outside of the science classroom. Assessment: Monitoring while students take notes and discuss with group members. Posing probing questions to groups for further understanding. Students will submit their post-observation questions explaining plate movement. Essential Questions: What two things can cause a rock to become metamorphic rock? How does sedimentary rock form? How could an igneous or metamorphic rock become a sedimentary rock? What type of rock would you expect to find around a volcano? In which type of rock should the team look for fossils and why?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#12 / #16	Weathering	Students will participate in an expert jigsaw activity in which each student in a group will be responsible for finding out key information about a separate weathering agent, including the definition, a neighborhood example, and a world example. Students will then relay the most important information on their agent back to their group, which will then be organized into a graphic organizer, highlighting the definition and examples of the following weathering agents: wind, water, ice, plants, animals, humans, and gravity. Students will make predictions on how rocks and landforms in pictures were weathered away, and then confirm their predictions.	Students **explain** how the various weathering agents work in the natural world. Adaptations: Students will be grouped by varying ability levels, so groups can work together to elaborate and clarify information if needed. Geology books will be available to read and explore for students who finish early. Assessment: Each student will have a graphic organizer highlighting the key information on each of the seven weathering agents investigated. This will be checked for accuracy. Essential Questions: What is weathering? What are the seven most important agents of weathering? How do wind, water, ice, plants, animals, humans, and gravity weather rocks? What are examples of these weathering agents at work in the natural world?

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Activity #/ Day #	Title/Label	Short Description	Function/Rationale
#13 / #17-18	*Science Seekers Part 3*: How does erosion change the landscape? / MCM	Students apply their knowledge of weathering and erosion to assist investigation of the *Science Seekers* question, "What location would fossils most likely be found at?" • Students will watch Science Seekers CD-ROM for introduction of the problem to be solved (What location would fossils most likely be found at?) • Students will read and take notes on their page, which reviews how wind and water can wear down rock, change the landscape, and expose fossils at the surface. • Students will re-teach their information with group members (members should take notes) • The teacher will remind students about the expert jigsaw they participated in, where they learned about the different agents of weathering and erosion. • Students will answer questions regarding material read in teams prompted by the CD-ROM.	Students will **explain** how weathering and erosion break down and build up the surface of the earth. Adaptations: Groups will be created by the teacher according to varying ability levels. Special needs students will all be given the same letter sheet so the special education teacher can assist outside of the science classroom. Assessment: Monitoring while students take notes and discuss with group members. Posing probing questions to groups for further understanding. Students will submit their post-observation questions explaining plate movement. Essential Questions: What is erosion? How does wind cause weathering of solid rock? How does wind create sand dunes? What is the Law of Superposition? How can water erosion uncover fossils?