MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.			
PE Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]	DCI • 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.	CCC • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.	Practices Developing and Using Models – *Modeling in 6-8 builds on K-5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.* Develop and use a model to describe phenomena.
Activity Small Groups: Sort rocks / minerals and begin to explain why they form differently.	Question(s) How do different types of rocks and minerals form?	Objectives / *Next Steps* • Rocks and minerals look different from one another. • Rocks and minerals form in different ways. *How do they form in different ways?*	Notes After the activity, establish that scientists would have grouped rocks in 4 mysterious groups (igneous, sedimentary, metamorphic, minerals)
Whole Class Demonstration: Melt sugar and divide the liquid between two pans. One pan should stay at room temperature and another should be placed in a fridge or freezer.	How do minerals form? Why are there different crystal sizes?	• Minerals form through crystallization. • The size of the crystals depends on the time it takes to form. The shorter the formation time, the smaller the crystals. *Can multiple minerals crystallize together?*	Heat approximately one cup of sugar with 2 tablespoons of cold water in a spotless saucepan over low or medium-low heat. Stir constantly until the mixture turns clear and begins to simmer. At this point, immediately pour the solution into two different pans and proceed with the experiment.
Notes for the Remaining Hands-On Activities As much as possible, provide students with options rather than solutions. You may provide more equipment than is needed, and provide them with access to all materials at once rather than doing each of the next 4 small group experiments individually. Minimum suggested materials needed are: hot plate, small aluminum pans, milk chocolate chips, white chocolate chips, sandpaper, small hammers, a large-mouthed bottle, powdered drink mix, food-ready eyedroppers, potable water, Starburst candies. Plastic cutlery is also helpful.			

Small Groups: Create a candy bar which looks like the model. (Use milk chocolate and white chocolate "minerals" to create a delicious candy bar "rock.")	How can you make these ingredients merge together to look like our sample? How does an igneous rock form?	• The heat from deep inside the Earth melts rock into magma. • Magma can cool to form igneous rock. *How can an igneous rock change?*	
Small Groups: Create a smooth-edged rock which looks like the model. (Dull the edges of a sharp-edged piece of shale or other soft rock.) As you're doing so, compare the process you are using to those processes used by nature.	How can you transform a sharp-edged rock into a smooth-edged one? How does a rock become smooth?	• Rocks are broken up into sediment due to weathering. • Weathering happens due to wind (blowing sand) and water (motion, dissolution, freeze/thaw). • Weathering is a process driven indirectly by the sun. *How does sediment turn into rock?*	Following this activity, it is important to address the natural processes as a class to ensure all the objectives are met. (Using sandpaper or swirling the rock in a bottle might represent sand blowing in the wind, or using a hammer might represent the force provided by flowing water.)
Small Groups: Create a candy drop which looks like the model. (Take drink mix "sediment" and glue its particles together.) As you're doing so, compare the process you are using to those processes used by nature.	How does sediment turn into rock?	• Sediment settles together and, through a combination of chemical reactions (cementation) and gravity (compaction), becomes sedimentary rock *Do all rocks form in this way?*	Following this activity, it is important to address the natural processes as a class to ensure all the objectives are met.
Small Groups: Take a Starburst candy and transform it to look like the (flattened) model *without tearing its paper wrapper*. As you're doing so, compare the process you are using to those processes used by nature.	How can you change your Starburst to look like the (flattened) sample? How do metamorphic rocks form?	• There is heat within the Earth coming from the core and mantle. • There is pressure from gravity acting on the rock above. • This combination of heat and pressure changes other rocks into metamorphic rocks. *Do rock processes only occur once? In what order do rock processes occur?*	While it may seem easy to flatten a Starburst using force, heat is necessary to change it without breaking.

Small Groups: Create a rock cycle model with two components:
• A Cycle Diagram which includes:
  • Magma
  • 3 main types of rocks
  • Sediment
  • Processes/Causes of change
• A Explanation which includes:
  • A description of each geologic process
  • The energy source for each process
  • A description of the relationship between each process and our activities
	What is the rock cycle?	• Work as a group to consolidate ideas gathered thus far.	

Whole Class: Review individual groups' models and develop a class consensus model.	What is the rock cycle? [Continued]	• (Refer to the student sample.)	