3rd Grade – Rock Cycle Ramble

Exploring the three types of rocks in No Thoroughfare Canyon & Devils Kitchen

Class Description

Along a hike into No Thoroughfare Canyon & Devils Kitchen students will take a closer look at different rocks and how they form.
Location: No Thoroughfare Canyon
Duration: 3 - 4 hours – 3 miles round trip

Standards Addressed:
Science 3.1 – Earth's materials can be broken down and/or combined into different materials such as rocks, minerals, rock cycle, formation of soil, and sand – some of which are usable resources for humans.

Enduring Understandings/Essential Questions

Earth is constantly changing
What is the process by which Earth's materials are formed?
How is the Earth's surface changing?

Vocabulary Addressed

Rock cycle
Sedimentary
Igneous
Metamorphic
Weathering
Erosion
Canyon
Monolith
Plateau
Earth's materials: minerals, rocks, soil, sand

Theme, Etc.

Theme

Rocks are changed as they travel through the rock cycle to form the three different types of rocks. Weathering and erosion is acting on the rocks in No Thoroughfare Canyon changing them from rocks to sediment.

Major Concepts

-Rocks are made of minerals.
-Three types of rocks; sedimentary, igneous, metamorphic
-The steps in the rock cycle can change rocks from one type to another.
-The landforms in CO NM are formed by weathering and erosion (flash floods in particular).
-Evidence of flash floods shows us that we are in the weathering and erosion stage of the rock cycle in NoTC.

Objectives

-Students will be able to distinguish between sedimentary, igneous, and metamorphic rocks found in the canyon.
-Students will be able to recognize 1 major characteristic of each type of rock.
-Students will be able to explain how the 3 types of rocks are formed.
-Students will be able to explain 2 pieces of evidence of weathering & erosion and the forces behind them

Theme, Etc.

Introduction: We are going to hike up No Thoroughfare Canyon and Devils Kitchen to look at the 3 types of rocks and how they formed.

Stop #1 (Chinle outcrop)

Theme: Sedimentary Rock
Props: sandstone rock cycle, swamp photo, sand dune photo, granola bar (chewy kind) - optional
Tips: have students take a closer look at a sedimentary rock, explain how it forms, optional - sedimentary rock is kind of like a granola bar (sediment are the oats, nuts, chocolate chips, etc. honey glues it all together), look at this mudstone (small grains in mudstone) have students break a piece of mudstone, talk about environments, swamp for chinle, take a piece of chinle with them and walk up the wash to the large sandstone boulder on the left, compare/contrast mudstone & sandstone. All sedimentary rocks, but form in different environments, where might we find enough sand to make this much sandstone (point to Devils Kitchen above)…right, desert for sandstone

Transition: *A long, long time ago, this area was covered in sedimentary rocks, just like these, but instead of wearing away, like these rocks are doing, they were buried way under the surface of the earth by a HUGE mountain range…as we walk, think of what might have happened to those rocks, what was it like way under ground?*

Stop #2 *(at the outcrop of gneiss (grey metamorphic rock) in narrower part of the canyon – after willows)*

Theme: Metamorphic Rocks
Props: Rock Cycle poster, granola bar (same one from before) - optional
Tips: have students feel the rock and discuss their observations, compare to sedimentary rock, etc., discuss how metamorphic rocks form from sedimentary or igneous rocks + heat & pressure, optional - use granola bar to demonstrate (have a student squeeze it & heat it with hands…take it out and look at it), very old, very strong

Transition *There is one more type of rock we haven't discussed yet…What would we get if we melted this metamorphic rock? Does anyone know what type of rock is made of magma or melted rock?*

Theme: Igneous Rocks
Props: Rock Cycle poster
Tips: Use the pegmatite dyke to illustrate igneous rocks…Guess where the igneous rock is, put your hand on it?, compare/contrast to metamorphic rock around it, discuss how igneous rock is formed, Find a crystal in this rock and put your finger on it, would you say the crystals in the igneous rock are bigger or smaller than the crystals in the metamorphic rock…the big crystals in this rock tells us it cooled slowly (underground)

Transition: *So now we are experts on how rocks form, but what is happening to the rocks around us right now? Right, they are breaking apart. As we walk back through the wash look around you for evidence of rocks breaking*

Stop #3 (on the DK trail where it borders the wash (after the large fallen juniper))

Theme: Weathering/erosion
Props: forces of weathering visual, ice @ waterfall photo, water erosion (sandstone holes) photo
Tips: Have students look up to devils kitchen and discuss how they think it formed. What is happening to all of our rocks here? (breaking down by weathering)…Can they find something in the area breaking rocks? What about evidence of rocks being broken by weathering? What would it look like if ice was breaking rocks? What

about water, what signs do you see that water is breaking apart the sandstone? Use visuals and discussion to connect the forces of weathering/erosion to the landscape.

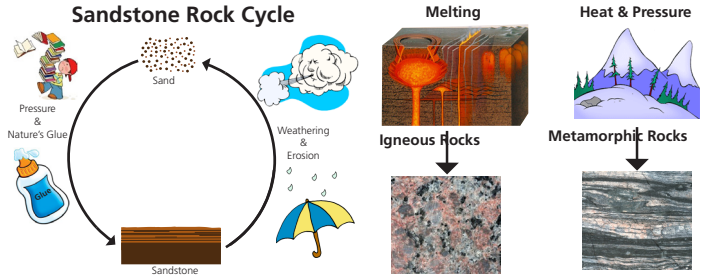
Transition *So there are lots of things in nature that break rocks, but weathering is just half of the story…after the rocks are broken they have to be moved. We call that erosion, think of some forces of erosion (things in nature that could move rocks) on the way to our next stop.*

Stop #4 (at a spot on the slickrock where they can see the wash below as well as the cliff wall across
Theme: Erosion
Props: forces of erosion poster, flash flood photos
Tips: What do you think happened here? Evidence of flash floods? Explain how the rocks were moved/channel was carved, describe flash floods, can you see any evidence of flash floods in this area? (shrubs knocked down, channel carved, huge boulders in wash, etc.) talk about other examples of erosion, describe how weathering & erosion creates the different landforms here (i.e. canyon, monolith, mesa/plateau) Use the landscape!

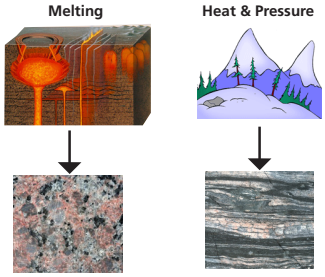
Transition: *At our next stop we will be sitting inside devils kitchen – as we walk think of how a monolith like devils kitchen could form and some of the forces that are changing it today.*

Stop #5 Conclusion – In Devils Kitchen
Review & discuss what they can observe about DK, have them describe how different steps of the rock cycle have effected devils kitchen throughout its formation. Tell them we are going to have some time to explore rocks in the kitchen, but that we need to be safe…rules talk

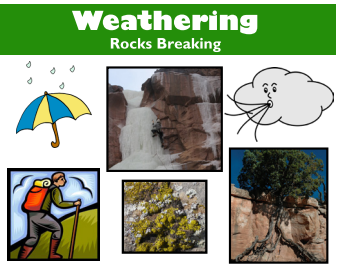
3rd Grade - Rock Cycle Ramble Props & Stops



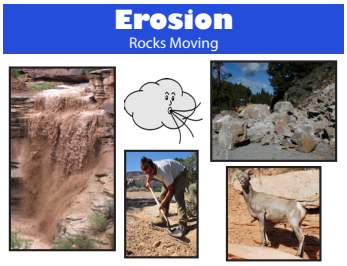
Stop #1
(Chinle Outcrop/Sandstone boulder



Stop #2
Gneiss/Pegmatite after willows



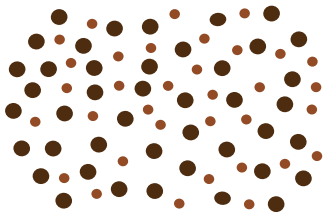
Stop #3
wash before DK stairs



Stop #4
on slickrock below kitchen

Sandstone Rock Cycle

Pressure
&
Nature's Glue



Sand

Weathering
&
Erosion

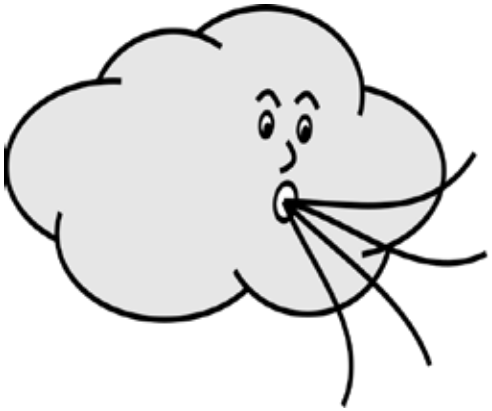
Sandstone

Desert Sandstone

Swampy Mudstone

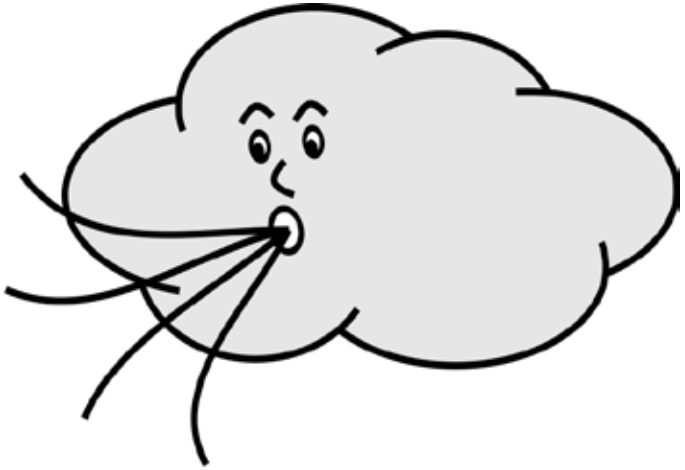
Erosion

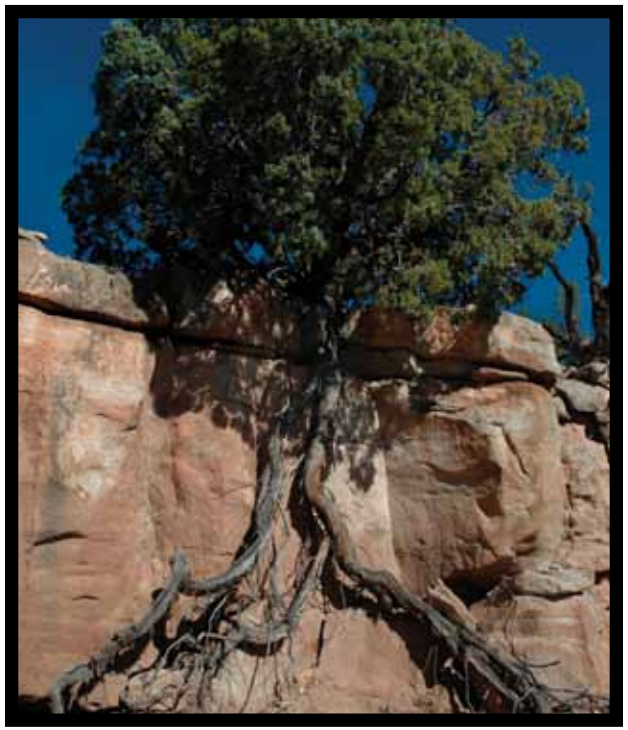
Rocks Moving



Weathering

Rocks Breaking





Freezing and Thawing


Water

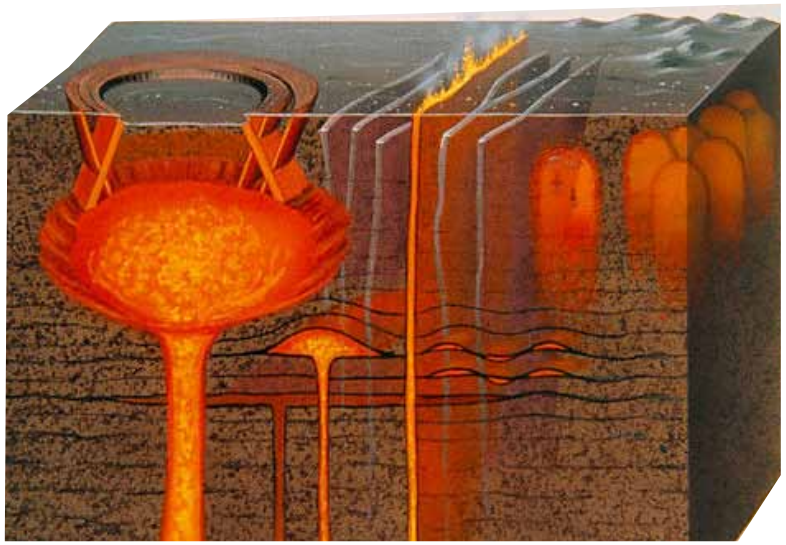
Flash flood behind Ranger Lindauer's house!

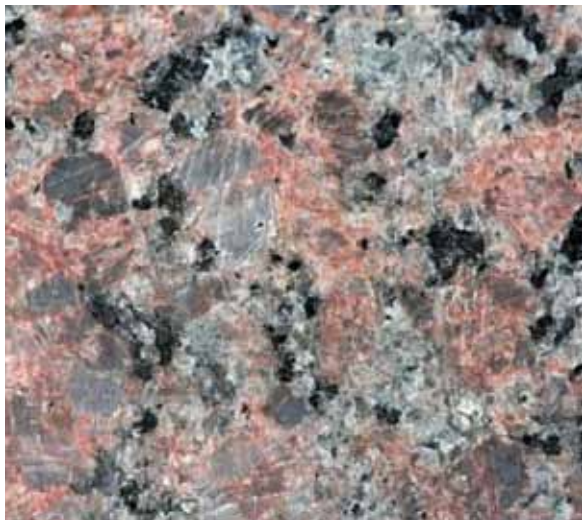
Flash Floods

July 26, 2011

July 26, 2011

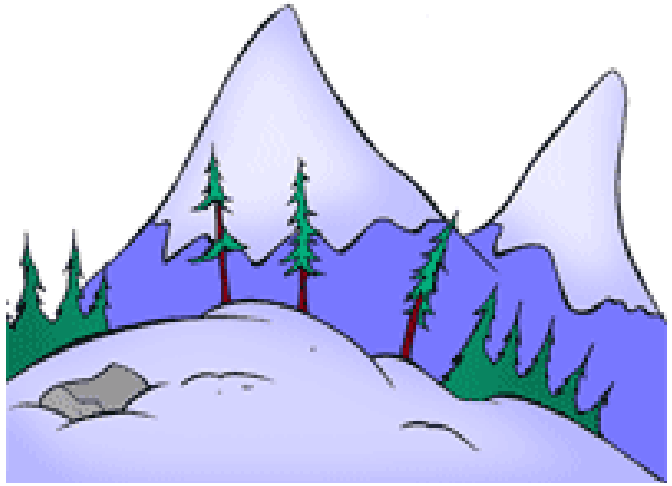
Melting





Igneous Rocks

Heat & Pressure



Metamorphic Rocks