

6th Grade –Exploring the Evidence

(Constructive and Destructive Earth's Processes)

Class Description

Students will go on a ranger-guided hike to the first pool in No Thoroughfare Canyon to identify the evidence of geological processes (rock cycle, weathering and erosion, flash floods) that formed the layers and carved the canyon.

Location: No Thoroughfare Canyon

Duration: 1 ½ Hrs., 2.5 miles

Standards Addressed

Science 3.1 *Complex interrelationships exist between Earth's structure and natural processes that over time are both constructive and deconstructive.*

Enduring Understandings/Essential Questions

Natural Earth processes have change, and will continue to change, Earth's surface features over time.

Models are used in science to study processes that are difficult to observe directly.

How do forces inside Earth and on the surface build, destroy, and change Earth's crust?

How do constructive and destructive forces interact in cycles to change Earth's surface over time?

Vocabulary Addressed

Constructive

Destructive

Weathering

Erosion

Sediments

Mechanical weathering

Chemical weathering

Models

Cycle

Uplift

Mountain building

Rock cycle

Sedimentary rock

Igneous rock

Metamorphic rock

Layers of the Earth (crust, mantle, outer core, inner core)

Evidence

Theme, Etc.

Theme:

Constructive and destructive forces such as uplift and weathering and erosion have worked to form and continuously shape No Thoroughfare Canyon.

Objective:

-Students will be able to describe how all 3 types of rocks are formed.

-Students will be able to list 3 examples of evidence of weathering and erosion they saw in the canyon.

-Students will be able to explain how No Thoroughfare Canyon was formed.

Major Concepts:

-plate tectonics/faulting

-3 Rock Types

-Rock Cycle

-Weathering & Erosion

Class Outline

Introduction: We will be hiking to a pool/small waterfall: along the way we will stop and investigate 3 rock types (sedimentary, igneous, metamorphic) and we'll be Looking for Evidence of Constructive and Destructive Forces along the way.

Beginning (Close to Trailhead)

Theme: Weathering and Erosion Review (Look for evidence of these as we hike.)

Props: Weathering and Erosion Poster

Tips: Review weathering and erosion and the forces of each using the poster...All of these forces leave their mark on the landscape.

Transition: As we hike today look for evidence of weathering and erosion..look for cracks where tree roots or ice could break the rocks, look for lichen growing on rocks and look for the most powerful of all of these forces: flash floods.

Stop #1 (In the wash by Devils Kitchen trail intersection)

Theme: We're in a dry stream bed!

Props: The landscape.

Tips: This dry stream channel that we'll be walking in can be a small river after it rains.

Transition: Look for evidence of water carving the channel and decide which way the water was flowing as we hike to our next stop.

Stop #2 At the large outcropping of Chinle (dark red mudstone)

Theme: Sedimentary Rock/Environments of deposition

Props: Swamp Photo

Tips: Have students pick up a Chinle rock and try to break it, talk about the idea of deposition and how sediments turn into sedimentary rocks. **(Constructive forces: glue, pressure).** Glue can be minerals like calcium carbonate.

Transition: Just ahead we'll be looking at a large boulder formed in a very different environment.

Stop #3 At large Sandstone Boulder below Devils Kitchen

Theme: Compare/Contrast Sandstone to Mudstone

Props: Dune photo

Tips: Have students touch the rock, what can they tell from the texture? (Sand = Sandstone). Talk about wingate sandstone environment, even though a different environment, similar **constructive forces like mudstone: glue and pressure.** This boulder eroded from the cliffs.

Transition: As we walk see if you can spot this rock from this photo. This photo is from July 2011 during a small flood from a thunderstorm. The pink stripe is igneous rock. Keep your eyes peeled for this and other igneous rock.

Stop #4 Large Precambrian Outcropping

Theme: Metamorphic rock

Props: 3 rock types poster, Rock cycle poster

Tips: 3 rock types poster: We looked close at Sedimentary (sandstone, mudstone) did anyone spot the rock or other rocks with pink stripes? Discuss igneous rock in COLM. Metamorphic rock – you're looking at it or sitting on it! Lots of heat and pressure – changed and strong. Ask students for some examples of the forces of how the rocks are formed and break down.

Rock Cycle poster: It's all one big cycle! Sometimes forces can be constructive and destructive at the same time! A flood can erode and deposit new sediment!

Transition: We're getting close, in this next section of trail, look for tree roots that are breaking rocks.

Stop #5 (If time)...Can be anywhere...works well near Cottonwoods

Theme: Make a model of the strata

Props: Canyon within a canyon poster (may need to only show one side)

Tips: Explain order of Precam, Chinle mudstone, Wingate Sandstone (Observe in the landscape if in a good location). Since we're standing in a wash where water deposits all types of broken rock bits, we can find samples of all three rocks) Have students build a model: stack three rocks: metamorphic, mudstone, sandstone.

Transition: Next stop the pool of water – give message of importance to not disturb the ecosystem.

If time at pool: show flooding photos: 1978 and small water fall photo.

Allow at least 40 minutes to get back to trailhead

6th Grade - Exploring the Evidence Props & Stops

Weathering

Rocks Breaking



Erosion

Rocks Moving



Chinle

(Swampy Mudstone)



Wingate

(Desert Sandstone)



Stop #1

(close to trailhead)

Stop #2

(Chinle Outcrop)

Stop #3

(Big Sandstone Boulder)

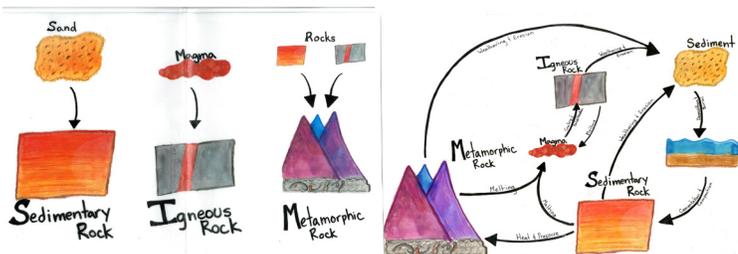
Transition

(after Big Sandstone Boulder)

Stop #4

(Precambrian rocks)

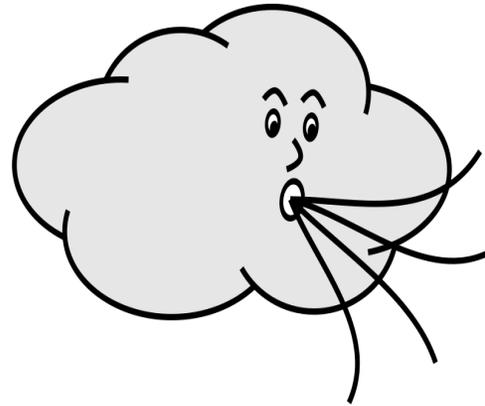
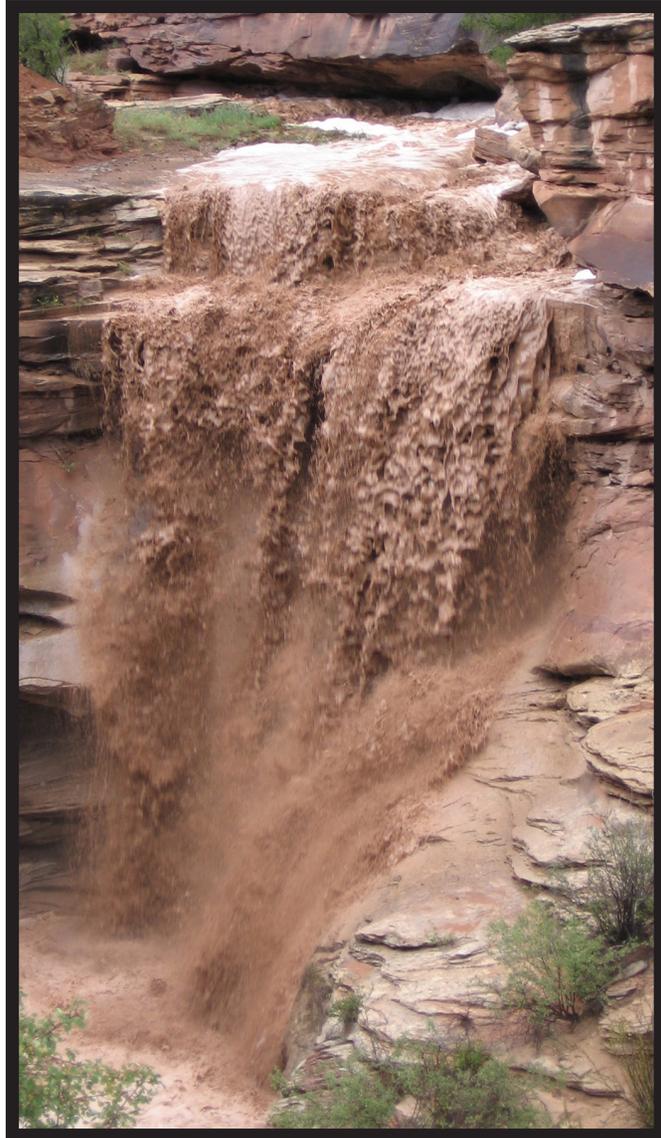
At Pool



6th Grade Exploring the Evidence Props

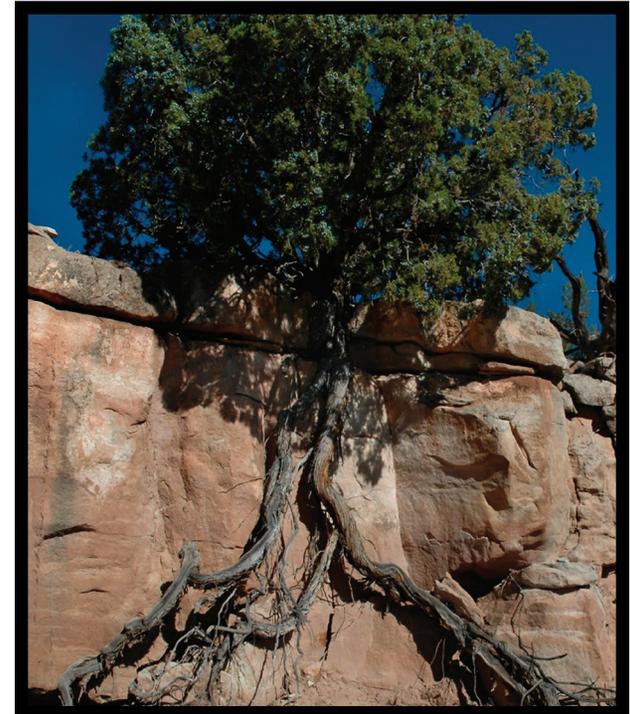
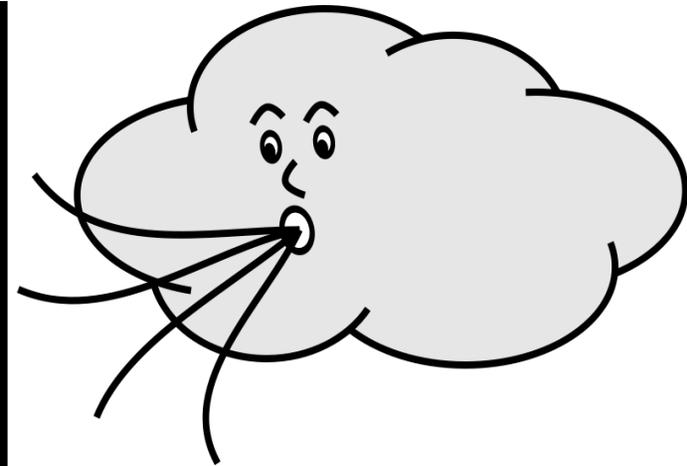
Erosion

Rocks Moving



Weathering

Rocks Breaking



Chinle

(Swampy Mudstone)

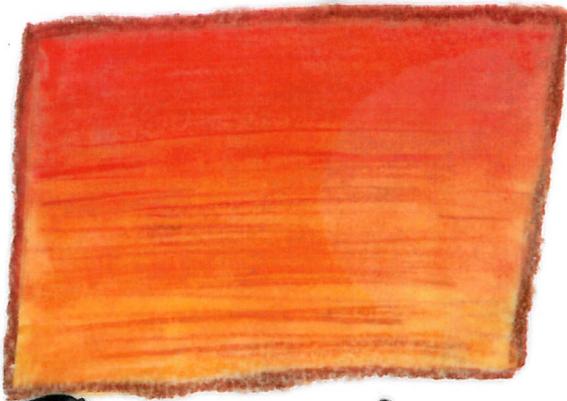
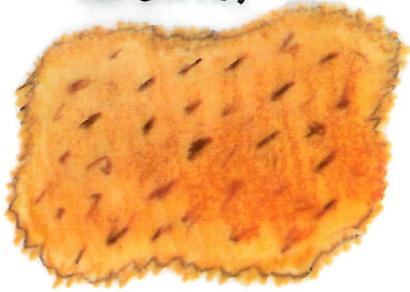


Wingate

(Desert Sandstone)

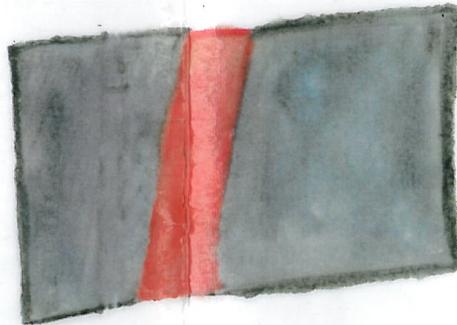


Sand



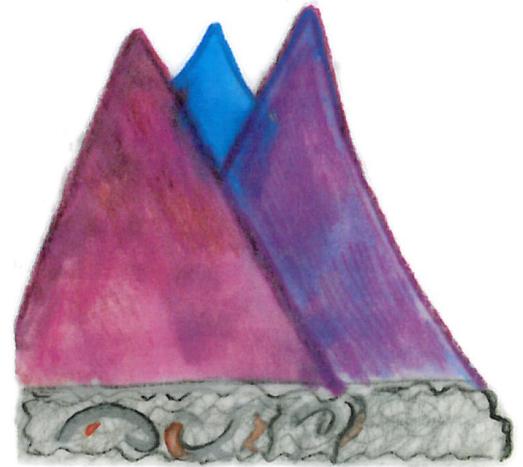
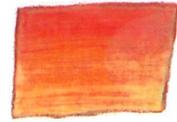
Sedimentary
Rock

Magma



Igneous
Rock

Rocks



Metamorphic
Rock

