

Walking Guide for Ranger

At beginning of trail, bend over and “pick up” a folded paper (the top secret riddle) that says, “Top Secret” on it in red writing. Hold it up for all the kids to see, and ask them if they think we should open it. (They’ll all say yes!) Read it out loud in a dramatic tone of voice, and ask the kids if they are ready to tackle the riddle of the rock breaker. (They’ll all be very excited). Let them know that we’ll stop 6 times along the ½ mile trail, where we’ll look for clues to help us solve the riddle. The ranger should always be the leader. Hand out a worksheet for each student to work on along the way. Bring pencils for the kids to use or share.

Stop 1, just after post 2

Geology-look around, be observant, what do you see?

Sagebrush-12x the fat content of alfalfa (deer rely on it during the winter)

Juniper-tolerate drought by isolating a limb

Pinyon evolved 30 million years ago

But look underneath your feet, too. (Rocks and soil!) Could the plants live without the soil? No. Could the animals live without the plants? No. Therefore,

Everything depends on the rocks beneath our feet, the geology.

Stop 2, at post #4

Igneous-Single out the San Juan Mountains-they are volcanic. How did they get there?

Tie in igneous rock, and explosive volcanoes. There are two kinds of volcanoes: those that are active that go glub, glub, glub and lava slowly pours out; explosive volcanoes, where rock and ash explode out. Where does the ash go? It falls like snow all over the place. The lava and rocks become igneous rock. All igneous rock was once liquid.

Stop 3, down the steps, under the pinyon trees

Mancos- Focus on the mancos Shale. Ask the kids what they know about the ‘dobes. Describe sedimentary rock again for them, and why this layer is different. What is all that grey/brown rock down there? Review how each type of rock is formed. This is sedimentary rock. Why is Flattop flat? Flattop has a layer of hard rock on top. What is it called when rocks break down? Erosion. What causes erosion? Rain, wind, water, etc. The hard rock on top of Flattop does not erode very easily, so it protects the softer rock beneath it.

Stop 4, after post #5

Hardness-rocks are made of different minerals cemented together. Draw analogies between mineral formations, and things they understand. Sometimes minerals=gemstones. How do we identify minerals? Hold up several different mineral examples. Ask them what differences they see between the minerals. Geologists perform certain tests, to determine the luster (shininess), color, weight, magnetism, and hardness to tell one mineral from another. We measure the hardness of minerals by scratching them against various items. For instance, if we can scratch our fingernail with the mineral, we say it’s harder than 2.5 on the hardness scale. If we can scratch glass,

then it's harder than 5. If a steel file doesn't scratch it, then it's harder than 7.5. A diamond has a score of 10 on the hardness scale. What's the hardest mineral? Diamond. What's the mineral that looks like gold, but really isn't? It's called pyrite, or fool's gold! Can you look around and find a shiny mineral called muscovite mica?

Stop 5, at post #6

Metamorphic- You'll have a great view of the canyon and the valley from here. You can address erosional geology, including river cutting (contrasting the Gunnison River with the Uncompahgre River), and including erosional remnants like the mesas across the canyon and Flat Top Mesa near Montrose.

You can address how magma moves below the surface and contrast the Vernal Mesa Quartz Monzonite that is abundant at this stop with the pegmatite that you saw at the last stop.

You can also address the concept of the Gunnison Uplift and of geologic time through uplift, erosion, rock formation and so on.

Stop 6, just after post #6, or up the hill

Warner- reverend from Montrose, worked with Congress to get the area recognized and protected. Who was the president who designated it a national park? Bill Clinton, in 1999.

After stop #6, ask the kids if they've solved the riddle. When they say lichen, ask them if they know what lichen is, and if they can find an example. Explain that lichen is a symbiotic relationship between an algae and a fungus (lichen is not a plant!). The algae is green (as you may have noticed if you haven't cleaned your fishtank in awhile) and can use sunlight to photosynthesize, or produce its own food. The fungus can't produce its food, so it relies on the algae for food, but it can provide shelter and hold the algae onto the rock. They benefit each other. Hold up the example and ask if this tiny organism can climb walls. Yes, because it clings to the rocks and grows in any direction. Is this tiny organism strong enough to break rock down into soil? Yes, because the symbiotic relationship between the algae and the fungus causes an acid to be secreted, which breaks down the rock very, very slowly and turns it into soil. And explain that it's very sensitive to air pollution. Based on the fact that we found it here, do you think we have clean air at the Black Canyon? Yes! Congratulations on becoming a Geologic Detective!

Top Secret! Do not read this unless you are prepared to dedicate yourself to solving the riddle of the rock breaker. Do you wish to proceed?

The riddle is this:

I am a pioneer who can climb the walls of the Black Canyon.

I am a creature so powerful and strong that I can turn rock into soil.

I am tough, but I can only survive where the air is clean.

WHO AM I? CAN YOU FIND ME?

He or she who is intelligent enough, passionate enough, and dedicated enough to solve this mystery shall truly be worthy of the title: Geologic Detective. Good luck to you, my friends.

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