ROCK TALK VOLUNTEER GUIDE

General guidelines and information.
Volunteers are encouraged to tailor presentations based upon their knowledge and experience and student interests.

OVERVIEW: The topics– minerals, mineral testing and identification, rock types, rock cycle, and fluorescent minerals. Optional activities are listed in the rocks category if you have time. Try to touch on the main topics, but engage with the group however you see fit. Below is an outline of what the UGS Volunteers usually do with the time. You will have 5 groups for 20 minutes each. **Save the last 3 minutes** or so for the UV rocks; they are a crowd favorite.

Minerals (7 min)

More than 4,000 naturally occurring minerals have been found on Earth. To identify a mineral, you have to test it by looking at its color, density, smell, magnetic properties, streak (color in powdered form), hardness (how easily it breaks or scratches), and reactions to acid.

- Show the differences in **color** by showing the azurite and malachite samples. Azurite is always blue and malachite is always green. You can't just rely on color to identify minerals though.
- Show the **density test** by dropping the galena sample into the bucket of water (very dense, sinks) and the pumice sample into the bucket of water (not dense, floats).
- Show the **smell test** by asking a volunteer from the group to smell the native sulfur sample and describe it.
- Show the **streak test** by scratching hematite and magnetite on a streak plate and pass it around to show the different colors.
- Show the **magnetic test** by putting a paperclip or magnet on the magnetite sample.
- Show the **hardness test** by scratching the gypsum sample and the quartz sample with your fingernail. Gypsum with scratch, quartz will not.
- Show the **acid test** by dropping a few drops of acid on the quartz sample and calcite sample and show the bubbling on the calcite to the group.

Minerals are different from rocks in that **rocks are made of minerals**.

- Show the class the mineral samples of orthoclase feldspar, quartz, biotite, muscovite, plagioclase feldspar, etc. and then show them the granite rock sample and point out the minerals present.

Not all rocks have mineral crystals so large and easily identified.

- Show the class the quartz sample and then show them the sandstone rock sample. Sandstone is made up of tiny quartz crystals and other minerals that make it turn different colors.

Rocks (10 min)

There are three different types of rocks: igneous, sedimentary, and metamorphic.

- Igneous rocks are made from melting and cooling.
    - Show the granite sample: Granite is formed from slow-cooling magma underground and has time to grow large crystals. (intrusive igneous rock).
    - Show the obsidian sample: Obsidian is formed from rapid-cooling magma after being thrown out of a volcano and has no crystal structure. Others like pumice and basalt may have holes. (extrusive igneous rock).
- Sedimentary rocks are made by erosion, deposition, and sedimentation.
    - Show the sandstone sample: Sandstone is the most common sedimentary rock and is deposited in layers. It has large grains and is well-sorted.
    - Show the split core sample: The core sample is a mix of shale, limestone, and sandstone and has very thin layers. The darker layers have oil in them. Geologists drill cores like this to look for those shale layers with oil to mine them.
    - Show the trilobite or shell fossils sample: Fossils are found in sedimentary rocks because they can be buried during the deposition process.
- Metamorphic rocks are made by heat and pressure.
    - Show the gneiss sample: Gneiss is the most metamorphosed metamorphic rock. When a rock is put under a lot of heat and pressure, the minerals inside will line up to make “nice/gneiss” stripes.
    - Show the schist sample: Schist is a rock that was under less heat and pressure so some minerals crystallize larger (point out garnet and staurolite).

All rocks are in the rock cycle. Any rock can turn into another type of rock by Earth’s processes.

- Show the rock cycle poster and quiz the group about how rocks change from one type to another.
    - For example: “If I melt and cool a sedimentary rock, what type of rock do I get?” or “If I put an igneous rock under a lot of heat and pressure, what type of rock do I get?”

Optional activities if you have time:

- Hold up rocks you haven’t talked about and have the group make guesses on what rock type it is and why. Use rocks with layers, fossils, large crystals, metamorphic stripes, etc.
- Any other rocks or minerals on the table that you or the group are interested in talking about can be discussed as time allows.

Fluorescent Minerals and Ultraviolet Radiation (3 min)

Fluorescent minerals glow when illuminated with invisible ultraviolet (UV) light. UV light lies beyond the violet end of the visible spectrum. Hundreds of minerals can glow, often as a result of impurities in the mineral, such as lead, uranium, or manganese, known as “activators.” Geologists use UV light to prospect at night for certain types of mineral deposits (e.g., scheelite, a tungsten mineral found in skarn deposits).

- Look at the specimens on the table under visible light. Ask the group to point to or guess which rocks will glow. Turn off the overhead lights and expose the rocks to UV light. (Pause for wows)

Triboluminescence is a property that some rocks have where when they are struck or scratched against an object, they glow.

- Hit the Sphalerite sample (zinc) with another rock with the lights out to show the glow from the chemical bonds being broken.
- Or bite down on a wintergreen lifesaver candy with your mouth open to get the same effect. In this experiment, it's the sugar bonds being broken.

Phosphorescence is a property where the rock will continue to glow after the UV light has been removed. (Sphalerite, Willemite, and Selenite, among others)

- Shine the UV light on one of the above samples and turn off the UV light but keep the overhead lights off to show the phosphorescence property.