

## Lesson Two: Wyoming Minerals Rock!

**Grade Level:** 5<sup>th</sup> Grade

**Time:** 60 minutes (Lesson can be broken into two 30-minute sections.)

**Essential Question:** How can we be stewards of Wyoming's mineral and energy resources to benefit current and future generations?

**Objective:** Students will learn what mineral resources exist in Wyoming and the individual properties of those minerals.

**Purpose:** Students research Wyoming's minerals and see that they are unique and important to everyone's daily life.

### Required Materials/Resources:

- Prepped mystery bag (see suggested teacher preparation)
- Bag or box to hold mystery bag items
- Provided pictures of mystery bag items (optional)
- Mineral information/fact sheets for bentonite, trona, rare earth minerals, coal, and uranium (one per mineral expert) or *send students directly to* <https://www.wyomingmining.org/> - (Sources: 1-8)
- Wyoming's Minerals Graphic Organizer (one per student)
- Wyoming's Minerals Property Sort Sheet (one per student)
- Wyoming's Minerals Property Sort Sheet Answer Key
- Set of green, yellow, pink, blue, and orange markers/colored pencils (one per student)

## Suggested Teacher Preparation:

### Part 1:

- Prepare a mystery bag with gathered items or provided images that contain bentonite, trona, uranium, rare earths, and coal. Suggested items include:
  - **bentonite:** cat litter, crayons, mineral water, lipstick, calamine lotion, mud mask, laundry detergent, paper
  - **trona:** baking soda, a glass, toothpaste, paper, cookie, cattle feed
  - **uranium:** picture of a tank, photo of nuclear power plant, picture of an x-ray, smoke detector
  - **rare earths minerals:** camera, welding visor, picture of an x-ray machine, phone
  - **coal:** you can put anything in that is manufactured, since coal energy helped make it, a light bulb
  - For more suggestions visit:  
[www.wyomingmining.org](http://www.wyomingmining.org)

TEACHER NOTE:  
Coal is technically not a mineral because it is made of organic materials. The Wyoming Mining Association classifies it as a mineral because it is mined.

### Part 2:

- Put students into groups of five, and assign each student a mineral, unless you want students in each group to choose their minerals.

### Standards:

Science: 5-PS1-3 (DCI) - (Explicit)


ELA: 5.RI.10 (Practiced/Encountered)

### Vocabulary:

- **Mineral** - a substance (such as quartz, coal, petroleum, salt, etc.) that is naturally formed under the ground
- **Property** - a special quality or characteristic of something

## Instructional Procedure/Steps:

### Part 1: Mystery Grab Bag

1. Prepare the mystery bag with a selection of items on the suggested list. Try to place 2 or 3 items from each mineral list. Include any of the items that fit in more than one category if possible.
2.  Present to students the bag or box full of mystery items. Either pull one item out at a time or lay them all out on a table to show the different items to students. Have students identify the items. Ask and discuss the following questions using think-pair-share. Be sure to call on every student at least once during the discussion:
  - **“Is this item important in your life? Why?”**
  - **“What would life be like without this item?”**
  - **“If you had to choose to give up any of these items, which ones would that be? Why?”**
3. When finished presenting all of the items in the bag, brainstorm what the items have in common as a whole class. *It is okay for student ideas to be incorrect/different at this point; you will discuss and cement connections further in the lesson.*
4. Say: **“All of these items utilize critical Wyoming minerals: coal, bentonite, trona, uranium, and rare earths. These minerals are an important part of Wyoming’s economy and culture. Today, we are going to learn more about these minerals and their properties.”**
5. Say: **“A property is a special quality or characteristic of something. Examples of properties could include**



In this task, students will be engaged in the higher order thinking skill of evaluation by judging and defending the impact of these minerals on their personal lives.

**color, hardness, electrical conductivity, magnetic forces, and the way it reacts with other materials. During the next part of our lesson, we're going to be looking at some properties of these Wyoming minerals."**

## **Part 2: Mineral Properties**

- 1. Say: "We are going to do a jigsaw reading, so you can become knowledgeable about the different Wyoming minerals and their properties. You will need to record information about your assigned mineral that answers the question 'What is your mineral and what are its unique properties?'"**
- 2. First, break the students into "home" groups. Put students into groups of five. These groups will be the "home" groups of the jigsaw. Say: "You are each going to be responsible for teaching one Wyoming mineral to the group you are sitting with now."**
- 3. Next, break into "expert" groups. Each group needs to assign an "expert" (or the teacher may choose to do this) for coal, trona, bentonite, uranium, and rare earths. Once each "expert" has his/her assigned mineral, have students leave the home group and sit with an "expert" group. These students are responsible for learning about one Wyoming mineral. Pass out the Wyoming's Minerals Graphic Organizers and the Mineral information/fact sheets. Ask students to read the Mineral information/fact sheet about his/her mineral and fill out the corresponding column of the Wyoming's Minerals Graphic Organizer with the information learned about the mineral. As students are working, they should be recording specific information that could include the following (answers may vary):**
  - *Bentonite - super-absorbent, clay, brownish gray, swells. Some uses: cat litter, crayons, cosmetics***

- *Trona - fairly soft, gray/white, made of crystals, dissolves in water. Some uses: glass, baking soda, toothpaste*
- *Uranium - silvery white metallic, radioactive, second heaviest element, solid at room temp, high melting and boiling points. Some uses: energy production, missiles, armor plating for vehicles*
- *Coal - (technically, not a mineral, but WY Mining Association classifies it as one since it is mined) Is a black, burnable rock; fossil fuel; burns with a high white flame. Some uses: energy, provides the energy for manufacturing*
- *Rare earth minerals - 17 minerals in this group, common, however, found in small quantities, mix well with other materials, have to be separated when mined. Some uses: cell phones, weapons, wind turbines, and MRI machines*

4. When all groups are finished in their “expert” groups, students will regroup with their “home” groups. Each student or “expert” is responsible for teaching his/her group members about their Wyoming mineral. While each “expert” presents, the other students listen carefully and fill out their graphic organizer. After all students share, the graphic organizer should be completed.

5. Say: **“You are now going to put your new knowledge into action and complete a mineral sort to see if you can identify the different characteristics of Wyoming minerals.”**

Pass out the Wyoming’s Minerals Property Sort Sheet with the various minerals students learned about. If not copied in color, instruct students to use highlighters or colored pencils to color-code the mineral headers as follows: bentonite - green, trona - yellow, coal - pink, uranium - blue, and rare earth minerals - orange.

Students must sort through the list of properties and characteristics of the minerals on the bottom of the sheet

and highlight them to match the mineral colors at the top. Once students are finished, collect the sort sheets and check for accuracy in their highlighting to ensure students can differentiate between the different minerals.

6. To wrap the lesson up, as a whole group, revisit items from the mystery bag and see if students can sort them into categories based on what mineral they contain. As a group, discuss similarities and differences of items in the same category.

**Assessment:** Students will each identify the properties that match the correct mineral in the Wyoming's Minerals Property Sort Sheet (step 5). Use provided answer key to check student understanding.

**Credits/Sources:**

1. Wyoming Mining Association. (2018). *Bentonite*. Retrieved July 18, 2018, from <https://www.wyomingmining.org/minerals/bentonite/>
2. Wyoming Mining Association. (2018). *Coal*. Retrieved July 18, 2018, from <https://www.wyomingmining.org/minerals/coal/>
3. Wyoming Mining Association. (2018). *Rare Earths*. Retrieved July 18, 2018, from <https://www.wyomingmining.org/minerals/rare-earths/>
4. Wyoming Mining Association. (2018). *Trona*. Retrieved July 18, 2018, from <https://www.wyomingmining.org/minerals/trona/>
5. Wyoming Mining Association. (2018). *Uranium*. Retrieved July 18, 2018, from <https://www.wyomingmining.org/minerals/uranium/>
6. Wyoming. State Inspector of Mines. *Annual report of the State Inspector of Mines of Wyoming*. Cheyenne: State Inspector of Mines.
7. ThoughtCo. (2017, December 10). *What is the Heaviest Element?*. Retrieved July 18, 2018, from <https://www.thoughtco.com/what-is-the-heaviest-element-606627>

8. mindat.org. (2018, May 20). *Trona*. Retrieved July 18, 2018, from <https://www.mindat.org/min-4031.html>