



Lesson Four: Show me the Money!

Grade Level: 5th Grade

Time: 60-75 minutes (This lesson can be done over two days. Day 1 would be steps 1-4. Day 2 would be steps 5-8.)

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

Objective: Students will analyze how Wyoming minerals impact the Wyoming economy by providing revenue and jobs.

Purpose: Students learn about Wyoming's economy and the large contribution minerals provide to the economy.

Required Materials/Resources:

- Wyoming Minerals Scavenger Hunt (one per student)
- Wyoming Minerals Scavenger Hunt key - (Sources: 1 - 3)
- Wyoming Minerals: Mining Production and Revenue Comparison graph (one per student)
- GDP graph for Wyoming and the United States (one to display)
- Electronic devices for students
- Wyoming Mining Association Website
www.wyomingmining.org (Source 2)

Suggested Teacher Preparation:

- Double check numbers in Wyoming Minerals Scavenger Hunt key prior to activity for potential industry changes listed on the Wyoming Mining Association website.
- Double check link for scavenger hunt.

- Familiarize yourself with the Wyoming Mining Association website and the mineral pages.
- Place students into pairs.

Standards:

Social Studies: SS5.3.2 (Explicit), SS5.6.3 (Practiced/Encountered)

ELA: 5.RI.7, 5.SL.2 (Practiced/Encountered)


Vocabulary:

- **Economy** - financial system of interaction and exchange
- **Gross Domestic Product (GDP)** - the total value of goods and services produced in a country during one year
- **Revenue** - money that is made by or paid to a business or an organization

Instructional Procedure/Steps:

1. Begin lesson by reviewing material from the previous lesson: Ask students the following questions:
 - **“What minerals are mined/are available in Wyoming?”** *Bentonite, trona, coal, uranium, and rare earths elements*
 - **“How are they mined?”** *Bentonite and coal are surface mined; uranium is mined in-situ (a dissolving process); trona is mined underground; and rare earth elements are available but are not mined at this time in Wyoming.*
 - **“Where are the mines located?”** *Bentonite is mined in northeast and northwest Wyoming; coal is mined in northeast and southern Wyoming; trona is mined in southwest Wyoming; and uranium is mined in central and northeast Wyoming.*

TEACHER NOTE: It might be helpful to display the maps from the previous lesson.

2.  Say: **“Today, you are going on an electronic scavenger hunt with a partner to determine how these minerals impact Wyoming’s economy.”** Discuss with students, **“What is an economy?”** and **“Why is a healthy economy important?”** Call on several students to get their definition of what an economy is and several to answer why they think economies are important. Once students have finished sharing, say: **“An economy is the financial system of interaction and exchange by which goods and services are produced, sold, and bought in a country or region.”** Depending on your students’ background, you may need to discuss examples of goods and services. Say: **“For our purposes today, our region is going to be Wyoming, and our goods are going to be the minerals that we extract and sell locally, nationally, and globally.”**
3. Assign student pairs. Say: **“Each of you will have a job: recorder and information finder. The information finder will be responsible for locating the information online. The recorder will be responsible for writing down the information that is found. You will be switching jobs half-way through our 30-minute time period.”** Pass out the Wyoming Minerals Scavenger Hunt sheet. Review the sheet with students and discuss with them what they are going to be finding. Give students 30 minutes to complete as much of the chart as they can. Remember to have students switch roles half-way through the 30-minute time period. Say: **“In order to fill out your scavenger hunt, you will research all 5 minerals and answer the following questions about each one:**
- **How many jobs does the mining of the mineral provide for the state?**
 - **How much of the mineral is produced in a year?**
 - **How much money, does each mineral**



In this task, students will be engaged in the higher order thinking skill of synthesis.

TEACHER NOTE:
Some of these questions are directly answered by the scavenger hunt; however, some are questions where students will have to infer or calculate the answers. The numbers in the answer key are based on the data at the time this unit was written. The numbers that students find should be close to these. (They will likely vary as the statistics get updated from year to year.) In addition, some tax revenue data was provided by an industry expert and is NOT included on the website. The actual numbers in the chart are not the focus of this lesson, so it is okay if students find numbers that vary a bit. The focus is that students understand the bigger picture of how each mineral impacts Wyoming’s economy.

contribute to the economy?

- **How much of the mineral is left to be mined and how many years will it last?**
- **How much total revenue the mining of each mineral brings to Wyoming?**
- **How many total jobs does the mining industry provide for Wyoming?"**

Say: **"Some of the information may be difficult to locate, so it's okay to skip around. Do your best to find all of the answers you can in the 30-minute time period."**

TEACHER NOTE:
During step 4, move throughout the classroom to make sure students are finding the information at the correct website and pages. If you want to complete this lesson in 2 days, stop at this point, and begin the next day with step 5.


4. Direct students to the following site/link in order to find their information: www.wyomingmining.org. Have site displayed and show students that once they are on the homepage, they need to go to the Mining tab and from there, choose each mineral from the drop-down menu. Also, show students that they might need to go to the production and employment section under the chosen mineral in order to find the information they need.
5. After 30 minutes, pull the students back together. Have students examine the data they found and interpret their findings. Provide any information that students were unable to locate in the 30-minute time period and have them add it to their charts. Ask students the questions listed below using the think-pair-share strategy. Students should think individually about their response to a question, discuss answers in pairs, and then share his/her own or the partner's answer with the rest of the class. Throughout the discussion, clarify any misconceptions or incorrect information the students may have.
 - **"What mining industry pays the most taxes?"**
coal, \$1 billion, all other mining industries only pay taxes in the millions

- **“Why are these taxes important?”** *build and maintain schools, maintain roads, pay for government programs*
- **“How many total jobs does the mineral industry directly provide Wyoming?”** *8,954*
“Are there other jobs that mining helps support?” *Be sure students know that many jobs are brought into Wyoming due to mining, such as engineers, biologists, heavy equipment operators, computer specialists, geologists, mechanics, etc. Estimates indicate that each coal industry position drives the need for three additional jobs in the state (Source 1.) If this is true for all mining industries, around 27,000 other jobs are impacted by mining.*
- **“What type of jobs are these ‘additional jobs’?”** *Teachers, waitresses, retail, etc.*
- **“What mineral has the potential to make an economic impact?”** *Rare earth elements, since they are not mined but could be. Uranium could also make a larger impact if we mined more since Wyoming has such large reserves.*
- **“Which mineral does Wyoming have the most reserves of?”** *456 million tons of uranium, trona is expected to last over 2,000 years, 162 billion tons of coal reserves*
- **“What do you notice about the percentage of the nation’s bentonite that Wyoming mines? Trona? Coal?”** *Wyoming is very high in terms of the percentages of trona and bentonite. Almost all of the U.S. supply comes from Wyoming. Coal isn’t as high percentage-wise, but it’s still a very large amount.*
- **“What would happen if Wyoming stopped mining some of these minerals?”** *loss of money for the state, loss of that mineral for the nation, loss of jobs, less money for schools, increased cost for electricity, etc.*

- **“Do you think other states have similar mining industries?”** *Other states may have similar industries but do not necessarily use the same extraction methods or the same amount of resources. Wyoming is unique in the amount of minerals mined and used throughout the country.*
- **“Why would it be important to be good stewards of Wyoming mining?”** *Mining is a major revenue source of the state of Wyoming. Most coal is owned by the federal government. It is a public resource, so it is important to be good stewards in order to maximize rewards to citizens.*




In this task, students will be engaged in the higher order thinking skill of analysis.


6.  Pass out the Wyoming Minerals: Mining Production and Revenue Comparison graphs. Say: **“One bar represents the production in tons of the minerals that are mined in Wyoming, and the other bar represents the amount of revenue or money that comes into the state from that mineral.”** Discuss how the price and/or revenue for each mineral is related to supply/demand. Say: **“For example, when the demand for coal dropped, the revenue that Wyoming receives from it also dropped dramatically.”** Ask: **“How could this impact you?”** *Answers will vary, but should relate to Wyoming losing money for schools, roads, and programs.* Ask: **“How is the price of each mineral related to its demand and/or scarcity?”** *The scarcer a mineral is, usually the more expensive the mineral is. The more common the mineral is; the cheaper the mineral is.*



In this task, students will be engaged in the higher order thinking skill of evaluation by comparing the production of Wyoming’s minerals versus the revenue generated by them.

7.  At the bottom of the graph students will see the question: **“When looking at the graph, what comparisons can you make between the production and the revenue of Wyoming’s minerals?”** Have students answer the question individually then bring students back together as a whole group to discuss their answers. Ask several students to share their answers.

Students should make the connection that there is a large amount of coal being mined in the state, and it brings in the most mineral revenue. Also, students should be able to see that even though there is a large bentonite and trona production (we produce the vast majority of the country's supply), it doesn't make as large of an economic impact. Another thing they might notice is that uranium production is fairly low in comparison to the other minerals; however, revenue is fairly large in comparison to the amount that is mined. When finished discussing, collect students' papers.

8.  Next, display the GDP graph for Wyoming and the United States. Have students think-pair-share with a neighbor and discuss what they notice about the amount of money that mining brings into Wyoming's economy. Pose the following questions for discussion:
- **“What do you notice about the revenue from mining?”** *Mining brings in a lot of money to the state and is critical for our economy.*
 - **“What would happen to Wyoming's economy if we were to lose all or part of our mining revenue?”** *Students should connect that money for building new schools, roads, and government would become very limited, and there would be more jobs lost than just mining jobs if the mining industry was to go away. Wyoming would have to explore alternative revenue sources. Education-related jobs would be lost because mining revenue supports the education budget.*
 - **“What do we need to do as good stewards of our mining resources to make sure that those revenues continue?”** *Students may not be able to answer this question yet; however, direct discussion should occur about the importance of students being informed citizens about these kinds of resources. In addition, discussions around thinking about the new technology developments*



In this task, students will be engaged in the higher order thinking skill of analysis.

TEACHER NOTE:
This discussion is an opportunity to draw out the cyclical, cause-and-effect nature of change leading to problem solving, new ideas, etc.

that are going to be needed in order to use those reserves in the best way possible is important.

Assessment: Students answer the question on bottom of the Wyoming Minerals: Mining Production and Revenue Comparison graph. (step 7) Correct responses should state that the mineral extraction industry makes a huge impact on Wyoming's economy and way of life.

Credits/Sources:

1. Wyoming Mining Association. Travis Deti. Executive Director.
2. Wyoming Mining Association. (2018). Retrieved July 18, 2018, from www.wyomingmining.org.
3. Wyoming Mining Association. (2017). *Bentonite Production and Employment* Retrieved July 31, 2017, from <https://www.wyomingmining.org/minerals/bentonite/bentonite-production-and-employment/>

