

Lesson Plan

Red Mountain Park

The most successful field trips visits where students have been prepared for their visit and are challenged to reflect on the visit after they return to the classroom.

Red Mountain Park Lesson Plan: Middle School Math and Science

In the text are questions for students to answer as they discover the history of Birmingham through Red Mountain Park.

Topics covered: Geography, history, chemistry, geology, math

This lesson plan courtesy of Jim Miller, retired in 2011 as a middle school teacher of science and math in Texas after a lengthy career in mining and the oil industry.

Attached is the project outline that I used to teach my junior high math students in Lufkin, Texas. This project was set up by me and critiqued by Katie Sullivan and Eric McFerrin of Red Mountain Park. You may use any part of it or all of it if it seems to fit any of your needs.

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Adapted for TrekBirmingham October 2013

THE PITTSBURGH OF THE SOUTH

GEOGRAPHY:

I am the largest city in a southern state whose name begins with a B and is listed as the first state in an alphabetically aligned list of the fifty states. I was granted statehood twenty-six years before statehood was granted to Texas. Four different southern states border my boundaries and a large saltwater body of water is part of my southern boundary.

1. What state am I?
2. What year did Texas receive statehood?
3. What year did my state receive statehood?
4. What four states border my boundaries?
5. What body of saltwater is part of my southern boundary?
6. What is the capital of my state?
7. What is the largest city in my state?

Birmingham, the largest city in the state of Alabama and once called “The Pittsburgh of the South” is located at the southern end of a mountain range that extends from the north in New York State to the south near the Birmingham area in Alabama. The elevations in the Birmingham area range from a low in the Shade Valley region of 644 feet above sea level to a high point of 970 feet above sea level on Red Mountain.

8. What is the name of the mountains that extend over a lengthy distance from the northeastern to southeastern sections of the United States?
9. What is the mathematical range between the highest quoted elevation in Birmingham and the lowest quoted elevation?

HISTORY:

The earliest settlers to the area of Alabama, that is now Birmingham, were farmers, but in 1840, iron ore was discovered. As a result of this discovery of brown iron ore, called limonite, the initial stage of an iron producing industry was started and in the following years would grow and remain the heart of one of the most important industrial areas in the United States.

During the Civil War, the Birmingham iron ore mines and the iron producing blast furnaces were the primary source of the pig iron needs of the Confederate States for the production of armaments and other materials for their military. The Union States relied upon similar iron producing sources in Pennsylvania.

10. The Civil War was fought from what year to what year?
11. What city in Pennsylvania was the main source of iron for the Union States' military needs?

Towards the end of the civil war, a large Iowa cavalry detachment of the Union States army destroyed most of the iron-producing blast furnaces in the Birmingham area, but over a short period of time following the end of the war, many of the furnaces were restored. The area within this portion of north-central Alabama became the center of the resurgence and expansion of iron ore mines, especially those mining red iron ore called hematite, as well as the furnaces and mills that produced iron. As a result, Birmingham became a city in 1871.

12. What mode of transportation, that moved materials and goods at a faster pace than wagons pulled by horses or mules, moved into Birmingham and assisted in making it a major industrial city?

The iron production and subsequently steel production made Birmingham the second largest producer of these two industrial metals in the United States for a period of time that did not end until the last red iron ore mine, Pyne, was closed to the south of Red Mountain on New Years Eve in 1971. During World War II, the mines and mills in Birmingham were the major producer of materials for armaments for the United States military. When the last mine was closed 305 million tons of iron ore had been mined. All of the blast furnaces and mills, with the exception of United States Steel #8 blast furnace in Fairfield, a suburban area of Birmingham, were also closed during this period of time. The Fairfield blast furnace is still operational producing 6500 tons of basic iron per day from ore mined in Minnesota. This tonnage of iron produced each day is about 1000 times greater than the total produced by the blast furnaces during the Civil War.

13. During what years did the United States participate in World War II?
14. How many pounds of iron ore were mined from the large deposits within Red Mountain and the surrounding area?
15. About how many tons of iron were produced by the blast furnaces on a daily basis during the Civil War?
- 16 – 18. Give three reasons why you believe that a large and extremely important industry, for not only Birmingham but the United States, failed and never recovered?

CHEMISTRY AND GEOLOGY:

Pig Iron and Steel were produced by the combining of an iron-bearing minerals, hematite or limonite with a sedimentary rock and the heating to some 2500 degrees using another sedimentary rock as the heat source. These three basic materials occur and were mined in the Birmingham area.

19. The mineral, hematite, is what color and contains what two chemical elements?
20. The sedimentary rock that combines with the iron ore in a blast furnace is called?
21. The sedimentary rock that is burned to form the heat source in a furnace is called?

Hematite, the major iron-bearing ore occurs in four separate layers, called seams, on the surface and within the subsurface of Red Mountain, and each seam contains the remains of 250-300 million year old marine invertebrate organisms. Many of these sea-going creatures are now extinct but thrived within the geological time period of their lives.

22. What do geologists call the remains of organisms that are found in ancient rocks?
23. What does the word invertebrate mean?
24. What does the word marine mean?

ECONOMICS:

The earliest extracting of iron ore was done by surface mining techniques, but as the iron producing industry expanded the need for larger volumes of red iron ore, underground mining had to be implemented. Most of the underground mines were slanted down into the earth while a few were vertical. Almost 50 of the underground mines were located on the major portion of Red Mountain, which is located in the southwestern section of the city of Birmingham

The miners that worked in the underground mines faced serious safety challenges and hard laborious work. The pay of the crew chief for an operating underground mine was \$1.63 per hour in 1949, at the peak of the iron producing age in the United States, while the average pay for an underground miner for the associated risks and labor was \$1.18 per hour. Many of these miners and the mill workers rented their homes from the companies they worked for and bought their food and supplies at a company-owned store, called a commissary. Sixty-one years later in 2010, the underground coal miner in the Birmingham vicinity makes \$21.57 per hour, an increase over almost 60 years of approximately 1,825%; has safer working conditions; paid medical benefits; savings plans; vacation plans; lives in his own residence; and purchases his needs from his stores of choice.

25. Find the difference in pay for 1 week for the underground iron ore miner in 1949 and the underground coal miner in 2010, both miners working a 40 hour week.

26. Find the difference in pay for a 50-week year for the underground iron ore miner in 1949 and the underground miner in 2010, both miners working a 40-hour week.

RECOVERY AND SUCCESS:

The City of Birmingham and the surrounding suburban cities suffered through the period following the closing of the mines and the mills of the almost singular industry that created employment and services for the people living there. As many cities that suffered an economic calamity have historically done, Birmingham could have declined as a major city and drifted into history as a major success and then a major failure, but this did not happen. Today, because of foresight by its people and the State of Alabama, Birmingham is a modern, forward-moving city, now a major health care and financial center for the southeastern United States and the home of the University of Alabama – Birmingham.

The mines that produced coal as the fuel to assist in the creation of iron and steel are now producers of coal for usage in various industrial plants and in the generation of electrical power. The limestone quarries are still active, extracting limestone to be used in road material and related industrial usages.

27. What is the sedimentary rock that is used as fuel to generate electrical power in central Alabama by a major energy producing company?

The railroad systems that once traversed Birmingham hauling iron ore, coal, limestone and the produced iron and steel products are now major eastern railroads that utilize this old city for a center of the system. They reach out from Birmingham to all major cities.

Recently, the city of Birmingham and the State of Alabama realized that many of the Red Mountain abandoned mines and the 1108 acres that surround them should be preserved as part of the great history of the city and for the usage of present and future generations as a hiking and recreation area. As a result of state, city, public and private funding, Red Mountain Park has been formed and opened to the public in 2012. The mines, the associated facilities, old mining town sites, and railroad right-of-ways covered by almost 50 years of vegetation, are being un-covered.

Pittsburg of the South: Test your knowledge:

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