



## Coal Mines and the Coking Process

### Coal Mining

- Choose one of the types of underground mining techniques. Illustrate the process used to mine the coal and label the important parts of the mine. Identify the type of mine:

**Shaft Mine:** has a vertical entrance into a mine; extends vertically from the surface to the different veins of coal

**Slope Mine:** has an entrance to a mine driven down through an inclined coal seam; follows the different dips and layers of the coal seam from the surface

**Drift Mine:** has a water-level entrance into a mine; a tunnel is cut horizontally into the face of an outcrop of coal

- Explain the mining that is done when the coal seam is found near the Earth's surface. Explain the meaning of each name and the differences among the three types of mines:

#### **Open-Pit Mine**

#### **Strip Mine**

#### **Surface Mine**

- Miners use a variety of processes to mine the coal from underground and surface mines. One of the main types is **Longwall Mining**. Explain the process, the equipment used, and the problems encountered by miners who do this type of mining.
- Define the two main types of coal. Explain the differences between the two, and locate the main areas of coal mining. Explain the type of mining that is done to recover each type of coal:

#### **Bituminous Coal**

#### **Anthracite Coal**

- Define the two lesser types of coal. Explain the differences between the two, and locate the main areas of coal mining for them. Identify the uses of these types of coal, and explain the type of mining that is done to recover each type of coal:

#### **Lignite Coal**

#### **Cannel Coal**



- Use a variety of resources to research the **Pittsburgh Coal Seam**. Identify the type of coal found there, the size and location of the seam, and the uses for the coal mined from the seam.
- Choose one of the important factors in coal mining. Describe and define the factor and its use in coal mining. Create an illustration to help explain the factor and its impact on coal mining:
  - the role of mules in the mines
  - the jobs of the breaker boys in the mines
  - the longwall mining method of bituminous mining
  - the room-and-pillar method of anthracite mining
- The main use for coal is to burn as a fuel in industry. At one time, the main product that was made using coal was steel. The main use now for coal is to create electricity. Explain these two main uses of coal. Describe the step-by-step methods of creating steel and electricity with coal.
- A variety of other products can be made from coal. Find as many products as you can that are made with coal. Choose three of the products. Explain how coal is used to make the products. Create diagrams to show the step-by-step procedures. Some possible products include:

plastics	perfumes	medicines
soaps	detergents	nylon items
nail polish	inks	glue
shoe polish	weed killer	fertilizers

- Choose one of the varieties of mining methods. Research the procedures for mining with that method. Find out the types of tools and equipment used. Explain what products are mined, how they are mined, and the types of jobs that are necessary for the mining. Create a poster or other illustration to show the step-by-step procedures in the method of mining. Some possible methods include:

Above ground mining – strip, open-pit, surface  
Underground mining – shaft, slope, drift  
Quarrying  
Dredging  
Pumping



- Explain how coal developed millions of years ago. Research the geology and topography of a coal seam. Create a visual display of the formation of coal in the Earth.
- Identify and define the three main types of fossil fuels: coal, petroleum, and natural gas. Explain how and where each formed, and describe the differences among them. Describe how each is used, and the pros and cons of each for use as a fuel.
- Research the different types of tools, equipment, and supplies needed for coal mining. Explain how each is used. Describe the different types of supplies that were used in the late 1800s and early 1900s, and how the equipment has changed today. Find the different types of supplies used for safety in the mines.
- Coal mining relies on the rock structure in the Earth. Define and describe the three main types of rocks: sedimentary, igneous, and metamorphic. Explain how each formed in the Earth, and describe the roles of heat, pressure, and time in the formation. Explain how each is important to the planning and success of coal mining.
- Explain about some of the major dangers of coal mining. Choose one to research. Describe the problems and how mining conditions contribute to the lack of safety in the mines. Discuss the safety measures that have been taken in order to reduce the frequency of disasters in the mines. Locate and describe some of the historic mine disasters that have occurred throughout Pennsylvania, the United States, and the world. Some possible disasters include:

cave-in  
toxic gas  
fire

explosion  
flood  
health issues

- Research one of the major environmental hazards that has resulted from mining or the use of coal in industry. Find out how the environment is affected, where it has occurred, how it can be clean up, and the present-day difficulties that still exist. Some possible disasters include:

air pollution  
land pollution  
gob piles, red dog  
animal issues

water pollution  
noise pollution  
subsidence  
plant issues



## The Coking Process

- Define the term and explain the process used to create coke. Describe how coal is transformed into the coke necessary for use in the steelmaking process. Illustrate the process and label the important parts.
- There are two main processes used to create coke. The first process used a beehive oven. That process was replaced by a process that used by-product ovens.
  - choose one of the processes; explain how it is used to change coal into coke for use in steelmaking; create a drawing to illustrate the beehive oven process or the by-product oven process;
  - compare and contrast the two processes; explain how they are alike; explain the differences and explain why the beehive oven was replaced by the by-product oven.
- Some of the by-products of the coke making process include the following: naphtha, nitric acid, benzene, and cyanogens. Use a variety of resources to find out what the by-products can be used to make. Identify some of the products and explain what they can be used for.
- Create a visual display of the coking process. Draw a poster, mural, or timeline, or make a model, diorama, brochure, or any other type of visual display. Label all of the important parts of the process to explain how coke is made.