

## **Building and Grounds Self-Guided Tour** Description and Curriculum Resources

<b>Location:</b>	Buckeye Furnace, near Wellston (Jackson), Ohio
<b>Tour:</b>	Self-Guided Tour of Buckeye Furnace Grounds
<b>Availability:</b>	Wednesday, Thursday, Friday Year-round, daylight hours 9:30 a.m. – 3:00 p.m., by appointment
<b>Time Allowance:</b>	45 minutes to 1 hour on site.
<b>Cost:</b>	Donations accepted
<b>Grades:</b>	K, 1 <sup>st</sup> , 2 <sup>nd</sup> , 4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup> , 7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup> , 10 <sup>th</sup> , adaptable to all Groups of more than 50 or more will be divided with staggered starts

### **Description:**

Student tours begin with a welcome and a brief orientation about the history of Buckeye Furnace and blast furnace iron making. During the self-guided tour students will have the opportunity to visit the various building on the grounds and learn how each played a role in the iron industry of the Hanging Rock Iron Region and the importance of furnaces such as this one as the industrial revolution swept America. Iron was in demand to build railroads, farm equipment, and the machinery for mass production.

Buckeye Furnace is a reconstructed charcoal-fired iron blast furnace with original stack, typical of those operating in southeastern Ohio's Hanging Rock Iron Region more than a century ago. Visitors to this 270-acre site can see the furnace, originally built in 1852, which went out of blast for the last time in 1894. Above the furnace is the charging loft where iron ore, limestone, and charcoal were loaded into the furnace, and the engine house that contained a steam-powered compressor. The reconstructed company store serves as a visitor orientation area. There are two natural trails.

### **Social Studies Academic Content Standards Addressed**

#### **History (Daily Life)**

1<sup>st</sup>. Raise questions about how families lived in the past and use photographs, letters, artifacts and books to clarify what is known and what is unknown.

2<sup>nd</sup>. Use historical artifacts, photographs, biographies, maps, diaries and folklore to answer questions about daily life in the past.

2<sup>nd</sup>. Identify the work that people performed to make a living in the past and explain how jobs in the past are similar and /or different from those of today.

#### **History (Industrialization)**

9<sup>th</sup>. Explain the causes and effects of the Industrial Revolution with emphasis on:  
a. How scientific and technological changes promoted industrialization in the textile industry in England; b. The impact of the growth of population, rural-to-urban migrations, growth of industrial cities, and emigration out of Europe; c. The

changing role of labor and the rise of the union movement; d. Changes in living and working conditions for the early industrial working class, especially women and children; e. The growth of industrialization around the world.

**10<sup>th</sup>**. Explain the effects of industrialization in the United States in the 19<sup>th</sup> century including: a. Changes in work and the workplace; immigration and child labor and their impact on the labor force; b. Modernization of agriculture; c. Urbanization; d. The emergence of a middle class and its impact on leisure, art, music, literature and other aspects of culture.

**10<sup>th</sup>**. Analyze the impact of industrialization and the modern corporation in the United States on economic and political practices with emphasis on: a. Laissez-faire policies; b. Monopolies; c. Standard of living.

**10<sup>th</sup>**. Analyze the reasons for the rise and growth of labor organizations in the United States (i.e., Knights of Labor, American Federation of Labor and Congress of Industrial Organizations) including: a. Unregulated working conditions; b. Laissez-faire policies toward big business; c. Violence toward supporters of organized labor.

### **People in Societies (Interaction)**

**5<sup>th</sup>**. Compare reasons for immigration to North America with the reality immigrants experienced upon arrival.

### **Geography (Human Environmental Interaction)**

**K**. Identify key natural resources that are used in the students' daily lives.

**10<sup>th</sup>**. Describe how changes in technology, transportation and communication affect the location and patterns of economic activities and use of productive resources.

### **Geography (Places and Regions)**

**4<sup>th</sup>**. Identify manufacturing, agricultural, mining and forestry regions in Ohio.

**4<sup>th</sup>**. Explain how resources, transportation and location of cities and industries in Ohio including major industries such as oil, steel, rubber and glass.

**6<sup>th</sup>**. Explain the distribution patterns of economic activities and how changes in technology, transportation, communication and resources affect those patterns including: agriculture, mining, fishing, and manufacturing.

### **Economics (Production, Distribution, and Consumption)**

**K**. Identify goods and services.

**1<sup>st</sup>**. Describe the ways people produce, consume and exchange goods and services in their community.

**2<sup>nd</sup>**. Recognize that most people work in jobs in which they produce a few special goods or services.

**3<sup>rd</sup>**. Explain the advantages and disadvantages of specialization and the division of labor to produce items.

**4<sup>th</sup>**. Explain how entrepreneurs organize productive resources to produce goods and services and that they seek to make profits by taking risks.

### **Economics (Scarcity and Allocation)**

**2<sup>nd</sup>**. Explain how resources can be used in various ways (e.g., a bushel of corn could be fed to cows, used to make sweetener, or converted to fuel).

**4<sup>th</sup>**. Explain how the availability of productive resources in Ohio promotes specialization in the production of goods and services and leads to trade.

### **Economics (Markets)**

**3<sup>rd</sup>**. Identify examples of economic competition in the local community.

**5<sup>th</sup>**. Explain how regions in North America become interdependent when they specialize in what they produce best and then trade with other regions inside and outside North America to increase the amount and variety of goods and services available.

**5<sup>th</sup>**. Explain the general relationship between supply, demand and price in a competitive market.

**5<sup>th</sup>**. Explain why competition among producers/sellers results in lower costs and prices, higher product quality, and better customer service.

**5<sup>th</sup>**. Explain why competition among consumers/buyers results in higher product prices.

**10<sup>th</sup>**. Analyze the development and impacts of labor unions, farm organizations and business organizations on the U.S. economy.

### **Social Studies Skills and Methods (Obtaining Information)**

**3<sup>rd</sup>**. Obtain information about local issues from a variety of sources including: maps, photos, oral histories, newspapers, letters, artifacts, and documents.

### **Buckeye Furnace Glossary:**

**artifact**. A material object of a culture such as a tool, an article of clothing, or a prepared food.

**banked** – The process of resting the furnace yet allowing the burden to remain hot by stopping the air blast.

**billets** – Wood that is from 4 to 7 inches in diameter about 4 feet long.

**blast furnace** – The furnace in which the primary reduction of iron ore to iron is carried out.

**blast furnace**. A furnace in which ores are smelted by blowing a strong current of air into the furnace from the bottom to make a very great heat.

**Blast stove** – The place which preheated the blast of air before it was pumped into the furnace.

**blowing tubes** – Tubes that carried the hot compressed air into the furnace.

**boshes** – The slanted walls at the widest part of the stack that connect to the hearth.

**brands** – Partly charred billets which remain after the pit has been coaled.

**burden** – The mixture of iron ore, limestone, and charcoal that is dumped into the furnace to process iron.

**burden** – The raw mixture of iron ore, charcoal, and limestone.

**butt** – The final remains of a burned-off pit.

**capital good**. A productive resource consisting of human-made materials needed to produce goods and services; capital goods include buildings, machinery, equipment, and tools.

**charcoal** – A fuel, a form of carbon, made by a process of partly burning wood in a place where the air is shut out.

**circular flow model**. A diagram that shows the flow of economic activity among sectors of the economy.

**coal**. A black mineral that is used as a fuel.

**coaling out** – Act of digging and raking charcoal from the pit.



**coke.** A gray-black substance used as fuel. Coke is made by heating coal with almost not air present.

**collier** – The person who prepares the pit and burns the wood into charcoal.

**comparative advantage.** The ability to produce goods or services at a lower opportunity cost than other individuals or countries.

**consumption.** The purchase and/or use of goods and services.

**cost.** An alternative given up as a result of a decision.

**crucible** – The place in the furnace where the molten iron slag accumulated.

**demand.** The quantities of a good or service that consumers are willing and able to buy at various prices during a given time period.

**division of labor.** The separation of total work required to produce a good or service into individual interrelated tasks.

**Dressing the pit** – Refilling a mull, where the fire had burned through, with new wood, leaves, and dust so that the exterior of the pit was restored to its original shape.

**economic growth.** An increase in an economy's ability to produce goods and services over time.

**entrepreneur.** An individual who organizes the use of productive resources to produce goods or services.

**entrepreneurship.** The organization of productive resources by a person willing to take risks to start a business.

**fagan** – the green pole that is about 18 feet long and 3 or 4 inches in diameter that is placed in the center of the pit.

**flow resource.** A resource that is neither renewable nor nonrenewable, but must be used when or where it occurs (e.g., running water, wind, sunlight).

**flux** – The impurities that are trapped in molten limestone. A glass-like waste.

**foot** – The first layer of billets and lap-wood in the pit.

**goods.** Objects that are capable of satisfying people's wants.

**gross domestic product.** The value of all final goods and services produced within a country's borders in a given year.

**head** – The uppermost layer of lap-wood forming the rounded top of the pit.

**head dust** – Old charcoal dust placed on the top of the pit to form a smudge blanket.

**hearth** – The lower cylindrical shaped area of the stack.

**human resource.** A productive resource consisting of the talents and skills of human beings that contribute to the production of goods and services.

**iron ore** – The raw mineral that when smelted with limestone and charcoal become iron.

**iron.** A grayish-white metal which is most important of all metals and is used in making steel.

**laborer.** A person who does hard work.

**lapping off** – Placing lap-wood on the outer surface to make the pit as tight as possible.

**lapping-off** – The process of filling in all possible air spaces and cracks.

**lap-wood** – Wood that is 1½ to 4 inches in diameter about 4 feet long.

**limestone** – A rock consisting mostly of calcium carbonate, when heated with iron ore and charcoal helps make iron.

**marginal benefit.** The change in total benefit resulting from an action.

**marginal cost.** The change in total cost resulting from an action.



**market clearing price.** The one price at which quantity supplied equals quantity demanded (equilibrium price).

**market economy.** An economic system that combines features of more than one of the traditional, command, and market systems.

**market.** The interaction of buyers and sellers exchanging goods or services.

**molten iron** – melted iron.

**mull** – soft spots found in the structure during burning.

**multinational corporation.** A large corporation that produces and sells its goods and services throughout the world.

**natural resource.** A productive resource supplied by nature (e.g., ores, trees, arable land).

**nonrenewable resource.** A finite natural resource that cannot be replaced once it is used (e.g., petroleum, minerals).

**piece** – The pit after some of the coal has been removed.

**pig or pig iron** – Cast iron made in the blast furnace, run molten into a pig bed (mold) and allowed to solidify.

**pigs or pig iron** – Cast iron made in the blast furnace, run molten into a pig bed (mold) and allowed to solidify.

**pit will blow** – Gases generated by the charring wood often causing the top of the pit to blow off.

**pit.**—The whole structure including the hearth and the pile of wood.

**primary source.** An account of an event by someone who was present at the event.

**private sector.** The part of the economy that involves transactions of individuals and businesses.

**producer.** A person who makes goods and services.

**product.** Something produced by human or mechanical effort or by a natural process.

**production.** The act of combining natural resources, human resources, capital goods, and entrepreneurship to make goods and services.

**productive capacity.** The maximum output that an economy can produce without big increases in inflation.

**productive resources.** The resources used to make goods and services (i.e., natural resources, human resources, capital goods).

**pull factor.** A social, political, economic, or environmental attraction of a new area that drew people away from their previous location.

**push factor.** A social, political, economic, or environmental force that drove people from their previous location to search for a new one.

**renewable resource.** A natural resource that can be regenerated if used carefully (e.g., fish, timber).

**scarcity.** The lack of sufficient resources to produce all the goods and services that people desire.

**script** – A quasi-currency (money) issued by a company and accepted only in the company store.

**secondary source.** An account of an event by someone who was not present at the event.

**shoulder** – That part of the pit where the second tier of billets meet the top layer of lap-wood.

**shoulder and head** – The upper layers of billets and lap-wood in the pit.



**slag** – The waste material formed during the smelting of iron.

**smelt** – The process of melting ore in order to get metal out of it.

**smelt.** To melt ore to separate the metal from it. The first step in making steel is to smelt iron ore.

**specialization.** The concentration of production on fewer kinds of goods and services than are consumed.

**stack** – A chimney with a liner used for exhaust.

**standard of living.** A person’s or group’s level of material well-being, as measured by education, housing, health care, and nutrition.

**supply.** The quantities of a good or service that producers are willing and able to provide at various prices during a given time.

**tap** – The process of opening the hearth to remove molten slag.

**trade-off.** The sacrifice of one option for another when a decision is made.

**traditional economy.** An economic system in which decisions on production and consumption are based upon customs, beliefs, rituals, and habits.

**tuyeres** – Openings that admitted the hot blast air pipes into the furnace.

**waist** – The portion of the pit where the first tier of billets and lap-wood meet the second tier.

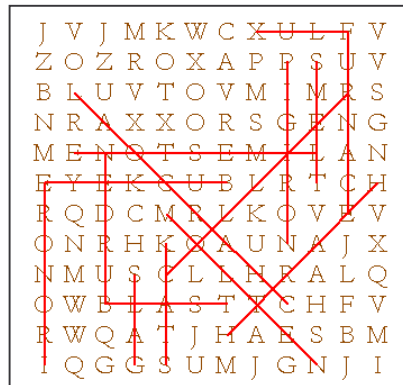
**want.** A psychological or physical desire that can be fulfilled through the consumption of goods and service.

**woodchopper** – The person whose job is to chop down the trees.

**woodhauler** – The person hauls the cut wood from the forest to the hearth.

**Pre/Post Visit Classroom Activities:**

- Buckeye Furnace Word Search
- Furnace Stack Maze
- Buckeye Furnace History pamphlet (in separate file)
- The Operation of a Charcoal Iron Furnace pamphlet (in separate file)
- American Charcoal Making pamphlet (in separate file)



Buckeye Furnace is operated by the Ohio Historical Society, a nonprofit organization that serves as the state’s partner in preserving and interpreting Ohio’s history, archaeology, and natural history.



## Buckeye Charcoal Iron Furnace Word Search

J V J M K W C X U L F V  
 Z O Z R O X A P P S U V  
 B L U V T O V M I M R S  
 N R A X X O R S G E N G  
 M E N O T S E M I L A N  
 E Y E K C U B L R T C H  
 R Q D C M R L K O V E V  
 O N R H K O A U N A J X  
 N M U S C L L H R A L Q  
 O W B L A S T T C H F V  
 R W Q A T J H A E S B M  
 I Q G G S U M J G N J I

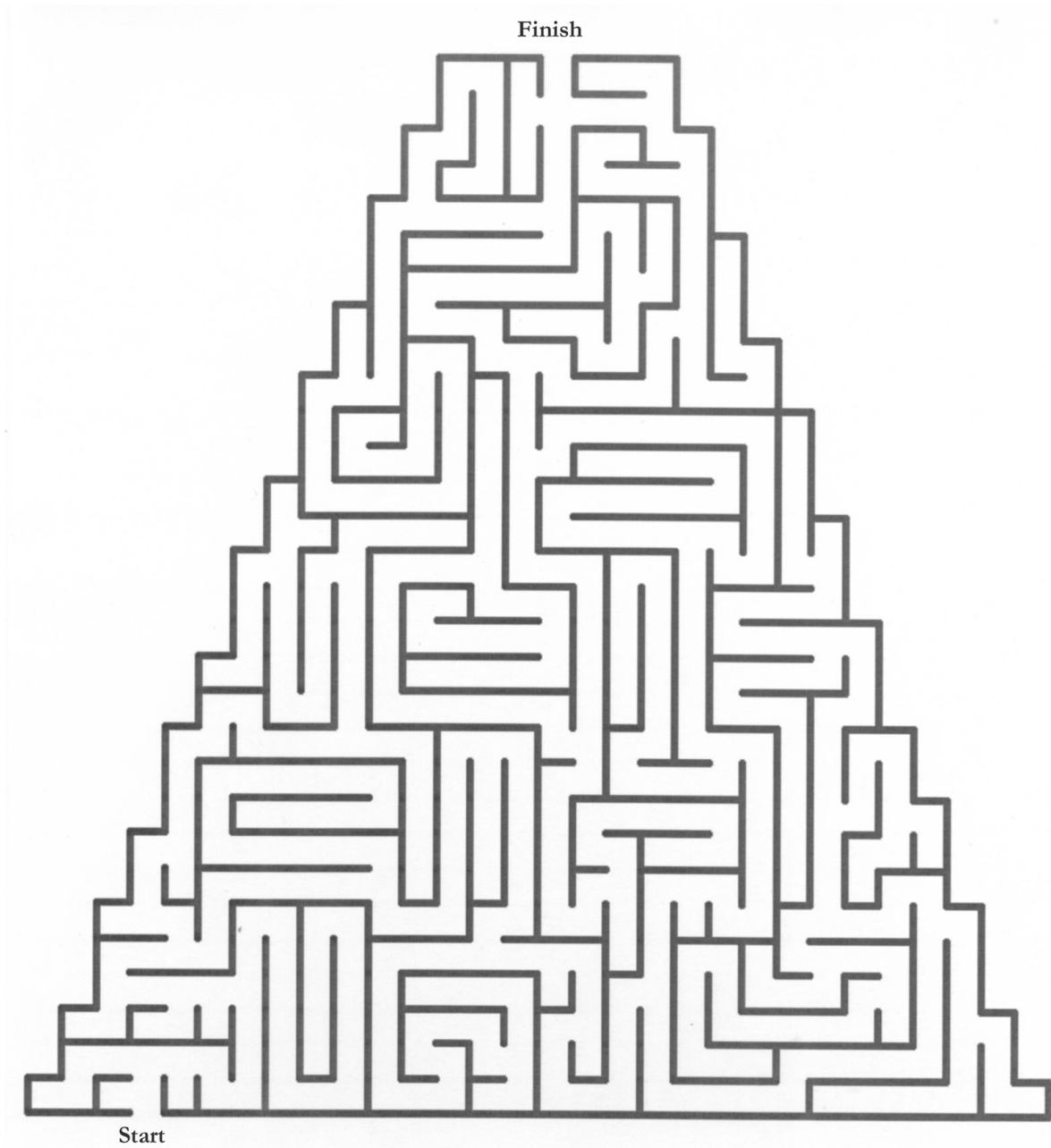
Blast	Charcoal	Furnace	Limestone	Slag
Buckeye	Collier	Hearth	Molten	Smelt
Burden	Flux	Iron ore	Pig iron	Stack

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## FURNACE STACK MAZE

Help the smoke find its way up the stack.



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