Saugus Public Schools
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Teaching with Historic Places Lesson Plan

Life and Work at the Saugus Iron Works

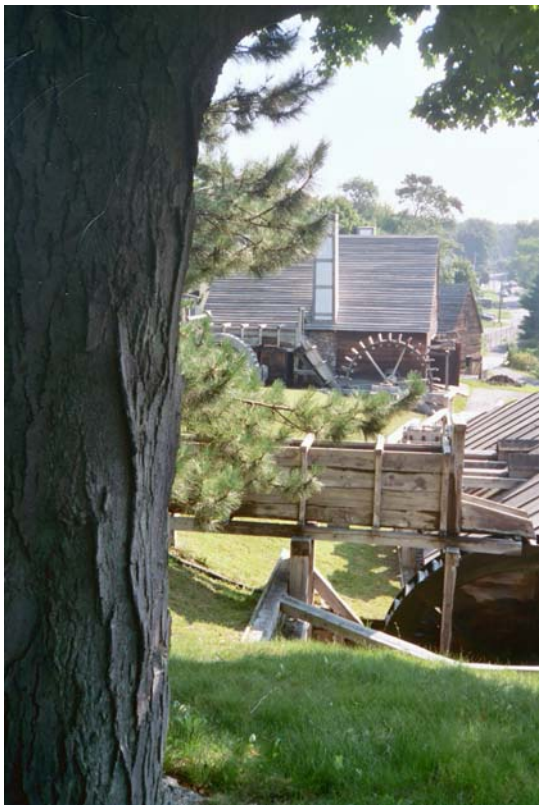
School: Saugus High School **Contributors:** Emily Sherman, M.Ed.
Subject: English, History, Social Sciences **Grade:** 9-12

Introduction:

This is a multidisciplinary unit that is focused toward special needs students at the high school level. These students will understand the local history of their community by studying the life of an ironworker in the seventeenth century at the Saugus Iron Works.

Objectives:

- Develop vocabulary and reading skills.
- Relate reading to real life experiences.
- Develop writing skills and speaking skills.
- Demonstrate an understanding of 17th century life.
- Demonstrate the ability to research sites on the Internet.



Some of the Saugus Iron Works buildings.

Materials:

- Computer equipment with Internet access
- Disposable cameras

Learning Activities:

Day 1

- Students will use the computer to research facts on the Saugus Iron Works.
- Group classroom discussion of research facts.

Day 2

- A National Park Ranger will visit the classroom the discuss life at the Iron Works in the 17th century.

Day 3

- Students will read Readings 1 and 2 and highlight the main facts.
- Students will develop a vocabulary list of unfamiliar words found in the readings.
- Students will look up definitions on their vocabulary list and comprise one master list of words for each student.
- Student will write sentences using the vocabulary list.

Day 4

- Students will look at Worksheet 1 and identify buildings that existed at the Iron Works site in the 17th century.
- Students will visit the historic Iron Works site.
- Students will take snapshots of relevant sites at the Iron Works.

The Saugus Iron Works blast furnace.

Day 5

- Pre-writing activity — students lead group discussion about their visit to the Iron Works and share their photos with classmates to spur discussions.

Assessment:

- Students will write a composition that compares and contrasts 20th century life with working / living conditions at the Iron Works during the 17th century.
- Students will make a portfolio of their pictures and essays to be displayed.

Reading 1: An Iron Works in New England

Teaching with Historic Places Readings

The Saugus Iron Works has been called the forerunner of American big business. It was an iron factory that converted raw iron ore into finished cast- and wrought-iron products. The process used to make these products was complicated and involved many separate steps. First, the raw materials for making iron were gathered near the blast furnace (see Drawing 1), which operated day and night. Colliers converted acres of trees into charcoal for fuel. Miners collected bog iron ore from nearby swampy areas and ponds. Flux, a mineral that rids bog ore of its impurities, was shipped from Nahant.

Charcoal, bog ore, and flux were dumped into the top of the stone furnace by workers called "fillers". The furnace was fired up, or "blown in" as the ironworkers called it. Beside the furnace rumbled one of the seven waterwheels at the ironworks which operated 18-foot bellows that helped to heat the furnace to a temperature of 3,000 degrees Fahrenheit. The liquid metal collected at the bottom of the furnace. Ironworkers had to continually skim the slag floating on top of the molten iron and dump it into the river. Once or twice in every 24 hours, the furnace was tapped by the "founder", the man in control of the furnace. The molten iron ran into trenches in the sand where it hardened into long cast iron bars. Smaller bars were poured off at an angle from the long bars. The configuration looked much like a mother pig feeding her piglets, so the long bar was called a "sow" and the smaller ones "pigs". Pig iron is another name for cast iron. Not all of the iron was cast into bars — skilled moulders were employed to make molds of items such as pots, pans, and kettles. Workers ladled liquid iron into these molds, which were buried in the sand floor of the casting shed. Cast iron is limited in use because it is brittle. Therefore, the cast-iron sows, which were the main product of the furnace, were taken to the forge (see Drawing 1) for refining.

With three fires crackling, four of the ironworks' waterwheels turning, three sets of bellows whooshing, and the 500-pound hammer crashing repeatedly on its anvil, the forge was the busiest and the noisiest of the ironworks buildings. There some 10 to 12 men worked to convert brittle cast iron into malleable wrought iron, a complicated process that required a high degree of skill. First, "finers" melted and refined sows. Repeated heating and hammering pounded many impurities from the iron. Flying sparks and pieces of hot metal constantly threatened men working in the forge. The noise of the 500-pound hammer cost many workers their hearing. The bulk of the iron at the forge was made into "merchant bars", three inches wide, one-and-a-half inches thick, and four to five feet long, which could be made into tools and used for building materials.

The rolling and slitting mill (see Drawing 1), situated just down the hill from the forge, contained the most advanced technology of all the machinery at the ironworks. It was one of only a dozen slitting mills in the world at that time. Its essential machinery consisted of a pair of rollers for flattening the merchant bars into sheets called "flats" and a pair of slitters for slicing the flats into thin strips of rod used to make nails. The rollers and slitters had to turn in opposite directions in order for the bars to pass through them. The "mill wright", who operated the waterwheels, made

Reading 1: An Iron Works in New England

sure the rollers and slitters operated at the same rate of speed. One waterwheel directly turned the lower set of rollers and slitters; the second waterwheel used gears to turn the top set. Flats produced here were used for making wheel rims, barrel hoops, and for repairing machinery at other ironworks. The nail rods provided the material for handmade nails, a valuable commodity in colonial America. These products were stored in an "ironhouse" or warehouse (see Drawing 1) until being loaded onto boats and shipped to either nearby American ports or to England.

Although the Saugus Iron Works operated for about 22 years, it eventually went out of business, a victim of mismanagement, high production costs, fixed prices, and competition from imported iron. The Saugus Iron Works produced respectable quantities of bar iron, but could not return a profit to its shareholders, who finally refused to advance more capital to the failing enterprise. The company's debts became so great that creditors brought suits to recover their loans. Court decisions caused production to decline and skilled workers to leave.

Records show that some ironworkers moved to different regions of New England where they continued to work in the iron industry. For example, James Leonard, who had been a forge worker at Saugus, became the manager of a forge in Bromingum in 1671 and a freeman (landowner) in 1688. Joseph Jenks, Jr., the son of a skilled craftsman, also worked at Saugus, beginning in 1649 when he was 16; in 1672 he erected his own forge at Pawtucket, Rhode Island. Others found jobs at established ironworks in New Jersey. Thus, it can be said that although Saugus Iron Works ultimately failed as an individual enterprise, it helped to lay the foundations for the iron and steel industry in the United States.

Questions for Reading 1

1. What were the three structures where ironmaking took place?
2. What were the salable wrought-iron products manufactured at the ironworks? What would these semi-finished wrought-iron products be used for?
3. Why did the ironworks go out of business? What happened to the workers?
4. What influences did Saugus Iron Works have on the Massachusetts Bay Colony? Did the impact reach any further?

Reading 1 was compiled from the National Park Service's visitors' guide for Saugus Iron Works National Historic Site, 1981; E.N. Hartley, *Ironworks on the Saugus* (Norman: University of Oklahoma Press, 1957); Mary Stetson Clarke, *Pioneer Iron Works* (Philadelphia: Chilton Book Co., 1968); and William Gray, "Saugus Iron Works National Historic Site" (Essex County, Massachusetts), National Register of Historic Places Registration Form, Washington, D.C.: U.S. Department of the Interior, National Park Service, 1975. It is used here with permission.

Reading 2: An Iron Works Community

Teaching with Historic Places Readings

Soon after the ironworks opened, its shareholders developed the village of Hammersmith to house the approximately 100 people they employed. Named after the town in England from which many of the ironworkers had come, Hammersmith was a "factory town". Located just off the main road between Salem and Boston, Hammersmith was within easy traveling distance of the more than 20 communities then existing in the Massachusetts Bay Colony. Although officially a part of Lynn (Saugus was a Native American settlement that the English originally called Lynn and then later changed back to Saugus), Hammersmith was three miles from the Puritan meeting house and center of town, and therefore an independent settlement in many ways.

On the east side of the Saugus River stood small houses that housed the ironworkers and their families. The ironworks itself included a farm, blacksmith shop, warehouse, pottery shop, charcoal house, and other facilities. Food produced from the farm was used to feed the ironworkers during the workday. The manager of the ironworks, first Richard Leader and later John Gifford, lived in a house adjacent to the ironworks. Although there is a restored 17th-century house on the site of the ironworks, there is no definite evidence that it was actually the home of the managers. It is the right size, however. The manager's house would have been large compared with those of the workers because managers often entertained guests, including investors, merchants, and local gentry.

The ironworkers who lived at Hammersmith knew the intensity of labor, and the discomfort of the heat and noise associated with the iron industry. They worked 12 hour shifts at dangerous and dirty tasks. Women, whose time typically was devoted to household duties, normally did not work in the ironworks. Sometimes, however, they were expected to act as "deputy husbands". That meant that when needed, they took their husbands' place to negotiate and handle trade, fill orders, and supervise field hands. With few doctors in Colonial America, women also were responsible for growing and preparing herbs for medicinal purposes. Herbs also were important for textile dyes, insect repellents, and rat poisons; for preserving meat; and for dispelling odors in the home.

Because most of Hammersmith's workers and their wives were illiterate, there are no letters or diaries to help us develop a more clear and detailed account of their personal lives. We will never have their own words to tell us what they thought about working at the ironworks. Instead, we must piece together an impression of their lives from many sources.

Some information about the people of Hammersmith comes from church and government records, which indicate that only a few of the Hammersmith villagers were Puritans. Although this may have caused some problems with their Puritan neighbors, many of the ironworkers and their children did marry into local Puritan families. Colonists from nearby farms and communities performed unskilled labor in the building of the ironworks and in working at the iron factory. This

interaction with other colonists suggests that Hammersmith residents probably behaved much like other citizens of Lynn.

Other historical records show that two groups of workers were different from the English settlers, however. In 1651 about 35 Scottish prisoners of war were brought to New England to work at the ironworks rather than being placed in English prisons. The Scots lived at Hammersmith or with colonists from nearby communities who also worked at the ironworks. They received clothing, food, and tobacco as a condition of employment. Many cut wood for charcoal. It is likely that by the second or third generation they were accepted in the same way as other settlers. The other group consisted of Native Americans who already lived in Saugus when the Massachusetts Bay Colony was established. Company records show that at least two Indians chopped wood for the same wages as other workers.

More information about the daily activities of Hammersmith workers comes from analysis of the artifacts found at the town site. These include axes, fish hooks, a bullet mold, hoes, kettles, pots, spoons, a pewter baby nipple, a jaw harp, a pot hanger, oxen shoes, clay pipes, hammers, nails, and countless other items. From analysis of these items and from historical data about how other early New England settlers lived, archeologists conclude that even though the ironworkers of Hammersmith took part in an important chapter of America's industrial history, their daily lives were little different from those of the Puritan colonists around them.

Questions for Reading 2

1. Why could Hammersmith be described as a "factory town"?
2. How did women fit into the ironworks community?
3. Do you think the ironworkers would have gotten along with other settlers living near the ironworks? Why or why not?
4. Do you think the Scots felt they were better off to be in the colony rather than in English prisons?
5. What evidence suggests that people were paid for the work they did no matter who they were?
6. Can you imagine what daily life in the 17th century at Hammersmith was like? What do the artifacts the people left behind tell you?

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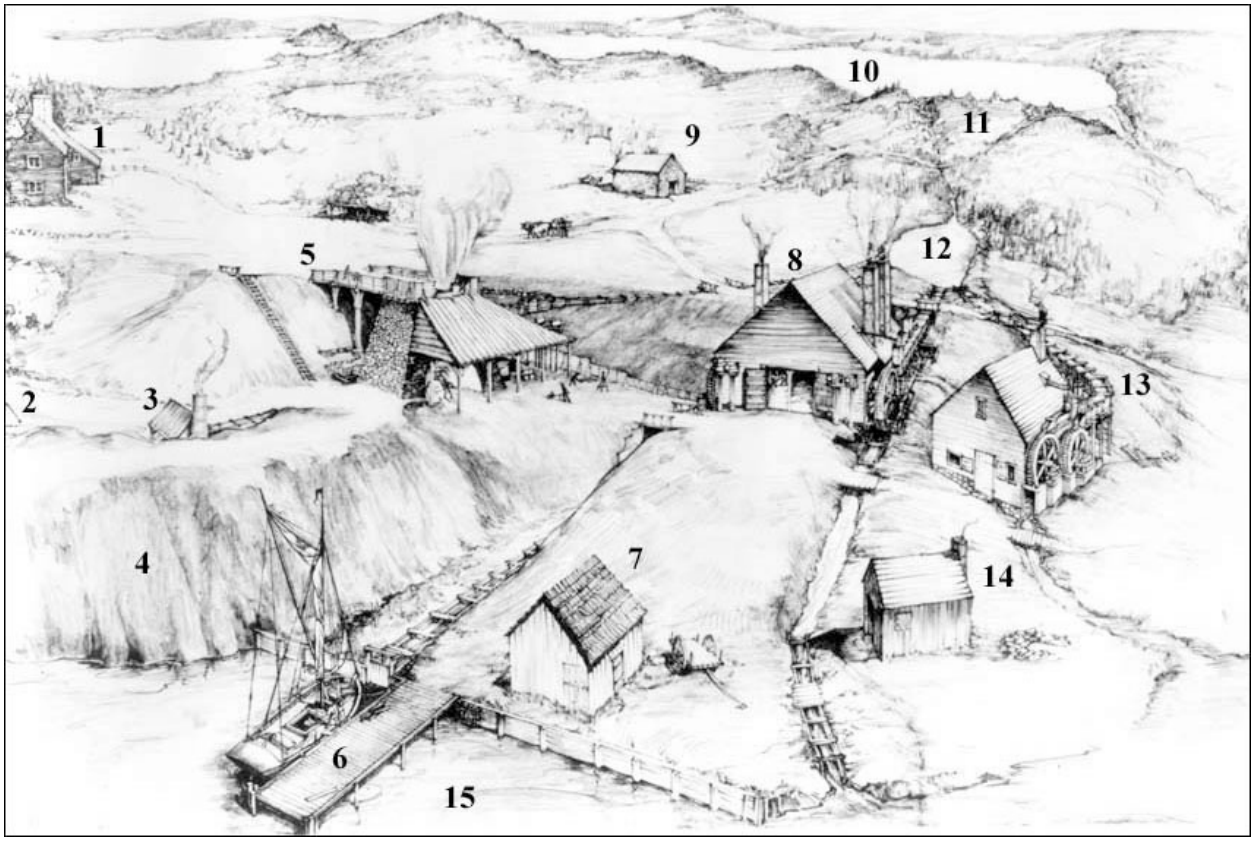
Worksheet 1: Iron Works in 1650

Teaching with Historic Places Readings



Drawing 1: Artist's conception of the Saugus Iron Works in 1650, by Charles H. Overly, 1953.

Key to Drawing 1:

1. Ironworks House
2. Grist mill
3. Joseph Jenks' blacksmith forge
4. Slag pile
5. Blast furnace
6. Dock
7. Warehouse
8. Forge
9. Charcoal storage house
10. Great Pond (main water supply)
11. Canal to ironworks
12. Holding Pond
13. Rolling and slitting mill
14. Blacksmith shop
15. Saugus River