

Name: _____ Date: _____

Industrial Revolution Matrix-A

Placard	Comprehension Questions	Critical Thinking Questions
The Industrial Revolution	1. When and where did the Industrial Revolution begin?	What was revolutionary about the Industrial Revolution?
	2. What was one of the first items to be factory made?	
Interchangeable Parts	1. How were mechanical objects made before the Industrial Revolution?	What would be the advantages of using interchangeable parts to make rifles?
	2. What did Eli Whitney have unskilled men do?	
Steam Engines, Steamboats, and Railroads	1. When was America's first successful steamboat launched?	Why would trains be a more successful form of transportation than steamboats? Why would railroads be better than rivers?
	2. How many miles of railroad track did the U.S. have in 1860?	

Placard	Comprehension Questions	Critical Thinking Questions
The Cotton Gin	1. How many people could a single person using the cotton gin replace in a day? 2. What was the increase in the amount of pounds that the South exported in two years?	How did the cotton gin help to strengthen the institution of slavery in the South?
Factory workers in the Northeast	1. What were the two types of employment systems that developed in the first factories? 2. Who did the Lowell System mostly employ?	What would have made the Lowell System attractive to a young woman in the early 1800s?
Inventors of the Early 1800s	1. Who is credited with the invention of the cotton gin? 2. Who created a new process for refining iron to make steel?	Why would African Americans or female inventors have been less likely to receive credit for their work in the 1800s?

The Industrial Revolution

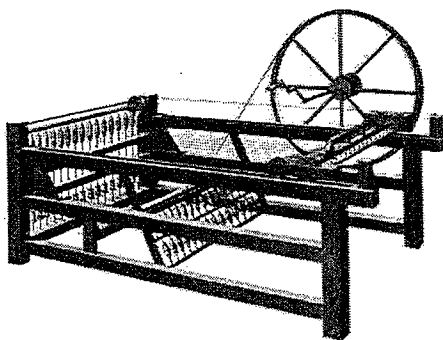
The Industrial Revolution began in Great Britain in the 1700's, when machines were first used to produce items that had previously been made by hand. The Industrial Revolution was not a war fought with soldiers or guns, but it changed society and the individual's role in society as completely as any war ever could.

Cloth was one of the first items to be factory made. Before the 1700's, thread and yarn were made from hand on a spinning wheel, and the thread and yarn were woven into cloth on a hand loom. It took many hours to produce cloth this way. Once the spinning jenny and the power loom were invented, cloth could be made in factories at a much greater speed.

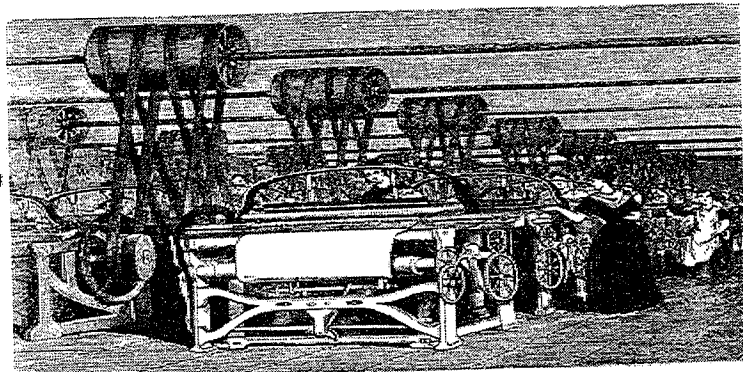
In 1790, Samuel Slater brought the first spinning machine to the United States. He opened a small mill in Pawtucket, Rhode Island. In 1810, Francis Cabot Lowell opened the first full scale textile (cloth) factory in Waltham, Massachusetts. The Industrial Revolution had come to the United States!

The Industrial Revolution had many long lasting effects on the United States. As more factories were built, more people were needed to work in them. People began to leave their farms to work in the factories. As people moved closer the factories, new cities developed and grew quickly.

The Industrial Revolution allowed people to produce more goods than they had in the past. Consumer goods became more plentiful and less expensive. Instead of working for themselves at home and setting their own hours, workers were now leaving home every day to work in a factory. The factory owner set the hours, pay scales and production goals. Individual workers had less control of their own lives. The factory system led to great changes in American society.



Spinning Jenny



Power Looms in a factory system

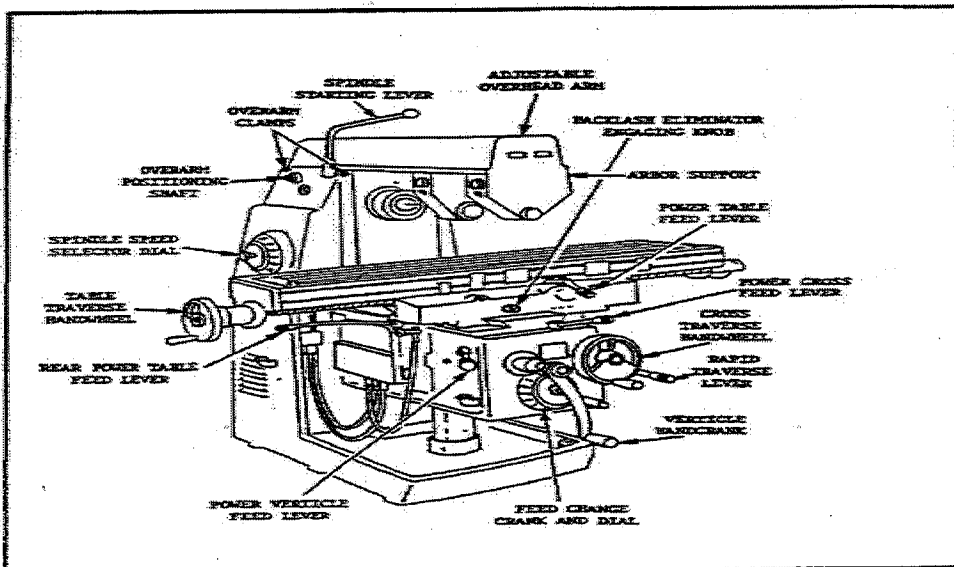
Interchangeable Parts

Before the Industrial Revolution, every mechanical object was made completely by hand. Because each object was made by hand, a similar object would be slightly different. No two objects would be exactly alike! Example: a rifle would have been made from start to finish by a single skilled craftsman. The parts of this rifle would not fit any other rifle, no matter how similar they appeared to be.

An American inventor, Eli Whitney thought of a new way to make rifles! Rather than have highly skilled men make individual guns, he had unskilled men make parts that could be put together to form complete rifles. Example: parts of a puzzle that make a whole picture. These parts were cut from a milling machine that Whitney invented. These parts were interchangeable and could be used in any rifle.

Interchangeable parts used in rifle and guns could be made and assembled much more quickly than a handcrafted gun or rifle could be made. The positive effect is that guns and rifles were easier to repair because only the broken parts had to be replaced!

Manufacturers of other products began to use Whitney's milling machine—making parts and objects needed for their own production. The invention of interchangeable parts initiated mass production. Goods were able to be made in great quantities by machines. Manufacturers and factories relied on the machines more than the human standing beside it!



Milling Machine

Factory Workers in the Northeast

The spinning and weaving machines of the early factories were driven by water power. Factories had to be located near quick-flowing rivers or waterfalls. New England became the center of manufacturing during the 1800's because of the abundance of waterfalls and streams.

Two types of employment systems developed in the first factories. One type was called the Rhode Island system. Entire families were put to work in these factories. The workers were housed near the factory and even small children worked in the mills. Small children were useful in the mills because they could squeeze around the large machines to change spindles. Often child wages were used to help the family and families did not see any difference between working on the farm to that of a factory.

The second type of employment system became known as the Lowell system. It was named after Francis Cabot Lowell, who built a textile (cloth) factory in Massachusetts in 1823. The company hired young girls between the ages of 15 to 30 from nearby farms to work in the mills. These girls came to be known as the "Lowell Girls." Most of the girls sent their wages home to their parents. Many of the young women welcomed these jobs as their opportunity to expand their experience and education before returning home to marry. Working hours in the mills were long—12 hours a day, 6 days a week. Females were paid about half the amount of wages as compared to men.

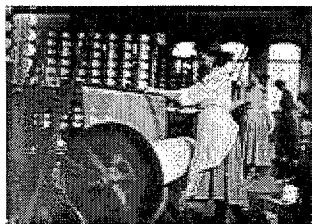
The Industrial Revolution had a great impact on the family and home life. As the factory system spread, more family members left home to earn a living. In poorer families, women had to go to work. In wealthier families, husbands supported the family while the wife stayed home which became a sign of success.



Child workers in a textile mill



Child worker



Lowell Girls

The Cotton Gin

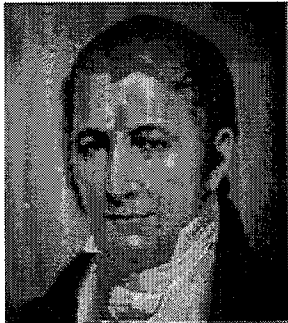
Cotton was very important to the South. It was so profitable that southerners did not feel the need to invest in factories—just grow cotton! Cotton remained the region's leading export and shaped the way of life in the South.

The Industrial Revolution greatly increased the demand for cotton. Textile mills in the North needed cotton to make cloth. Southern planters could grow plenty of cotton because the South's soil and climate were ideal. However, removing the seeds from the cotton by hand was a slow process. Planters needed a better way to clean cotton.

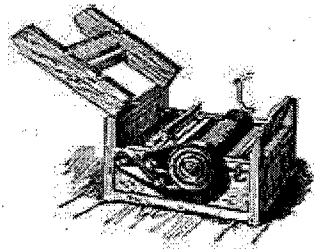
Eli Whitney was a young Connecticut school teacher. He was traveling to Georgia to become a tutor on a plantation. There were few schools in the South. Whitney learned of the planters' problem and decided to build a machine to clean cotton. In ten day days he came up with his first model.

The cotton gin had an enormous effect on the southern economy. A single worker using the cotton gin could do the work of 50 people cleaning cotton by hand. Southern planters devoted their money and their land to the cultivation of cotton. In two years, the amount of cotton exported from the U.S. rose from 135,000 pounds to over 1.5 million pounds.

Before the invention of the cotton gin, slavery had been dying out in the South. Cotton still had to be planted and picked—both by hand. Southern planters stopped talking about freeing their slaves. Sadly, they bought more land and more slaves to work the lands...which lead to greater profits for the Southern planter.



Eli Whitney



Cotton Gin machine

Inventors of the Early 1800's

Men and women contributed to the "invention boom" that started and supported the Industrial Revolution. Some people are better known than others...but all had a place in shaping our country!

Benjamin Banneker was the son of a former slave. He created what may have been the first American made clock using only a pocket watch as a model. Also, he assisted Pierre L'Enfant in planning the nation's capital, Washington D.C.

Henry Bessemer was an Englishman that pioneered the mass production of steel. Before steel can be made from iron, impurities in the iron must be removed. Bessemer discovered that directing a blast of hot air directly on molten iron ore could purify iron. This process became known as the Bessemer Process. Steel manufacturing skyrocketed...so did tall buildings!

Robert Fulton designed the first commercially successful steamboat. Also, he designed a submarine and a floating fort for New York harbor.

Henry Blair was an African American inventor that may have been the first African American granted a patent. He invented the corn planter that allowed workers to plant more seeds with less labor.

Eli Whitney is perhaps the most famous American inventor. He is credited with the invention of the cotton gin. Whitney also pioneered the use of interchangeable parts in manufacturing.



Henry Bessemer



Henry Blair



Benjamin Banneker

Steam Engines, Steamboats, and Railroads

Nothing symbolizes the industrialization in the United States better than the steam engine. In the 1820's and the 1830's the U.S. became the world leader using steam power, especially for transportation.

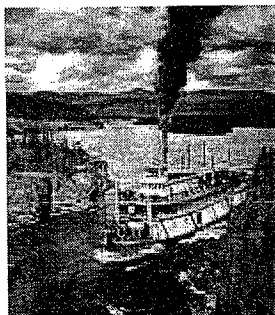
Floating downstream on a flatboat was more comfortable and faster than bumping along on rutted roads. Moving upstream against the current was difficult. People used paddles or long poles to push boats against the currents. The same route upstream took three times as long as it did traveling downstream.

An American inventor, Robert Fulton built the first commercially successful steamboat, the *Clermont*, in 1807. The *Clermont* used a steam engine to turn a side paddle wheel, which moved the boat through the water. The *Clermont* proved to be a major success; far faster than sailing ships. Steamboats revolutionized travel on major rivers. Passengers were provided with means of travel and farmers and merchants had a means of moving goods to other cities and locations within the country. River travel provided the interior part of the country connections to areas that had not been accessible.

In the 1830's, Americans began to use steam for another form of transportation—railroads. The first railroads were built mostly in the Northeast. Early steam powered trains were small and slow. Train travel quickly improved. By the 1860's, the U.S. had more than 30,000 miles of track. Railroads revolutionized travel in America, allowing speedy transportation of people and goods to areas that had been unreachable before. Railroads remained the most reliable form of transportation until the invention of the automobile.



Steam powered train



Steamboat