INDUSTRIAL REVOLUTION

The Industrial Revolution, which took place from the 18th to 19th centuries, was a period during which predominantly agrarian, rural societies in Europe and America became industrial and urban. Prior to the Industrial Revolution, which began in Britain in the late 1700s, manufacturing was often done in people's homes, using hand tools or basic machines. Industrialization marked a shift to powered, special-purpose machinery, factories and mass production. The iron and textile industries, along with the development of the steam engine, played central roles in the Industrial Revolution, which also saw improved systems of transportation, communication and banking. While industrialization brought about an increased volume and variety of manufactured goods and an improved standard of living for some, it also resulted in often grim employment and living conditions for the poor and working classes.

CONTENTS
Britain: Birthplace of the Industrial Revolution
Innovation and Industrialization
Transportation and the Industrial Revolution
Communication and Banking in the Industrial Revolution
Quality of Life during Industrialization
BRITAIN: BIRTHPLACE OF THE INDUSTRIAL REVOLUTION
Before the advent of the Industrial Revolution, most people resided in small, rural communities where their daily existences revolved around farming. Life for the average person was difficult, as incomes were meager, and malnourishment and disease were common. People produced the bulk of their own food, clothing, furniture and tools. Most manufacturing was done in homes or small, rural shops, using hand tools or simple machines.

DID YOU KNOW?
The word "luddite" refers to a person who is opposed to technological change. The term is derived from a group of early 19th century English workers who attacked factories and destroyed machinery as a means of protest. They were supposedly led by a man named Ned Ludd, though he may have been an apocryphal figure.

A number of factors contributed to Britain's role as the birthplace of the Industrial Revolution. For one, it had great deposits of coal and iron ore, which proved essential for industrialization. Additionally, Britain was a politically stable society, as well as the world's leading colonial power, which meant its colonies could serve as a source for raw materials, as well as a marketplace for manufactured goods.

As demand for British goods increased, merchants needed more cost-effective methods of production, which led to the rise of mechanization and the factory system.

INNOVATION AND INDUSTRIALIZATION
The textile industry, in particular, was transformed by industrialization. Before mechanization and factories, textiles
were made mainly in people's homes (giving rise to the term cottage industry), with merchants often providing the raw materials and basic equipment, and then picking up the finished product. Workers set their own schedules under this system, which proved difficult for merchants to regulate and resulted in numerous inefficiencies. In the 1700s, a series of innovations led to ever-increasing productivity, while requiring less human energy. For example, around 1764, Englishman James Hargreaves (1722-1778) invented the spinning jenny ("jenny" was an early abbreviation of the word "engine"), a machine that enabled an individual to produce multiple spools of threads simultaneously. By the time of Hargreaves' death, there were over 20,000 spinning jennys in use across Britain. The spinning jenny was improved upon by British inventor Samuel Compton's (1753-1827) spinning mule, as well as later machines. Another key innovation in textiles, the power loom, which mechanized the process of weaving cloth, was developed in the 1780s by English inventor Edmund Cartwright (1743-1823).

Developments in the iron industry also played a central role in the Industrial Revolution. In the early 18th century, Englishman Abraham Darby (1678-1717) discovered a cheaper, easier method to produce cast iron, using a coke-fueled (as opposed to charcoal-fired) furnace. In the 1850s, British engineer Henry Bessemer (1813-1898) developed the first inexpensive process for mass-producing steel. Both iron and steel became essential materials, used to make everything from appliances, tools and machines, to ships, buildings and infrastructure.

The steam engine was also integral to industrialization. In 1712, Englishman Thomas Newcomen (1664-1729) developed the first practical steam engine (which was used primarily to pump water out of mines). By the 1770s, Scottish inventor James Watt (1736-1819) had improved on Newcomen's work, and the steam engine went on to power machinery, locomotives and ships during the Industrial Revolution.
TRANSPORTATION AND THE INDUSTRIAL REVOLUTION
The transportation industry also underwent significant transformation during the Industrial Revolution. Before the advent of the steam engine, raw materials and finished goods were hauled and distributed via horse-drawn wagons, and by boats along canals and rivers. In the early 1800s, American Robert Fulton (1765-1815) built the first commercially successful steamboat, and by the mid-19th century, steamships were carrying freight across the Atlantic. As steam-powered ships were making their debut, the steam locomotive was also coming into use. In the early 1800s, British engineer Richard Trevithick (1771-1833) constructed the first railway steam locomotive. In 1830, England's Liverpool and Manchester Railway became the first to offer regular, timetabled passenger services. By 1850, Britain had more than 6,000 miles of railroad track. Additionally, around 1820, Scottish engineer John McAdam (1756-1836) developed a new process for road construction. His technique, which became known as macadam, resulted in roads that were smoother, more durable and less muddy.

COMMUNICATION AND BANKING IN THE INDUSTRIAL REVOLUTION
Communication became easier during the Industrial Revolution with such inventions as the telegraph. In 1837, two Brits, William Cooke (1806-1879) and Charles Wheatstone (1802-1875), patented the first commercial electrical telegraph. By 1840, railways were a Cooke-Wheatstone system, and in 1866, a telegraph cable was successfully laid across the Atlantic. The Industrial Revolution also saw the rise of banks and industrial financiers, as well as a factory system dependent on owners and managers. A stock exchange was established in London in the 1770s; the New York Stock Exchange was founded in the early 1790s. In 1776, Scottish social philosopher Adam Smith (1723-1790), who is regarded as the founder of modern economics, published "The Wealth of Nations." In it, Smith promoted an
经济系统基于自由企业，私人拥有生产手段，缺乏政府干涉。

QUALITY OF LIFE DURING INDUSTRIALIZATION
The Industrial Revolution brought about a greater volume and variety of factory-produced goods and raised the standard of living for many people, particularly for the middle and upper classes. However, life for the poor and working classes continued to be filled with challenges. Wages for those who labored in factories were low and working conditions could be dangerous and monotonous. Unskilled workers had little job security and were easily replaceable. Children were part of the labor force and often worked long hours and were used for such highly hazardous tasks as cleaning the machinery. In the early 1860s, an estimated one-fifth of the workers in Britain's textile industry were younger than 15. Industrialization also meant that some craftspeople were replaced by machines. Additionally, urban, industrialized areas were unable to keep pace with the flow of arriving workers from the countryside, resulting in inadequate, overcrowded housing and polluted, unsanitary living conditions in which disease was rampant. Conditions for Britain's working-class began to gradually improve by the later part of the 19th century, as the government instituted various labor reforms and workers gained the right to form trade unions.

INDUSTRIALIZATION MOVES BEYOND BRITAIN
The British enacted legislation to prohibit the export of their technology and skilled workers; however, they had little success in this regard. Industrialization spread from Britain to other European countries, including Belgium, France and Germany, and to the United States. By the mid-19th century, industrialization was well-established throughout the western part of Europe and America's northeastern region. By the early 20th century, the U.S. had become the world's leading industrial nation.