20– The Industrial Revolution: 1750-1870

Before the French Revolution and Napoleonic Wars shook Europe, Britain had a foretaste of the tremendous economic changes that would dramatically change the world. In the late eighteenth and early nineteenth centuries, several factors aligned that led to the creation of factories. Urban centers swelled as people left their rural homes and fields to make their livelihoods in cities.

KEY TERMS

Anti-Corn Law League	Crystal Palace	Jeremy Bentham	Proletariat
Bessemer Process	entrepreneur tariff	John Stuart Mill	Ten Hours Act of 1847
bourgeoisie	Factory Act of 1833	joint-stock investment bank	trade union
capital	Flora Tristan	Luddites	
capitalism mass production	Great Exhibition of 1851	Mines Act of 1842	
Chartist movement	Industrial Revolution		

KEY CONCEPTS

- Great Britain was able to dominate the industrial economy by mechanizing the production of textiles, iron, and steel. Its supply of iron, coal, and other raw materials, its large work force, stable political climate, and forward-thinking political class served as a solid foundation for the Industrial Revolution.
- Economic growth during the Industrial Revolution both resulted from and supported the revolution. The creation of new technology required large amounts of capital (money or property). The handsome profits from that new technology made for strong economies that fueled the development of dynamic urban centers.
- The Industrial Revolution took place in France, Prussia, and other nations of Western Europe, often with state sponsorship, while Eastern and Southern Europe were held back by various factors, including geography, lack of resources, powerful traditional nobility, and the persistence of serfdom.
- New classes, the bourgeoisie and the proletariat, developed in industrializing areas due to socioeconomic changes that created new divisions of labor.
- Europe experienced rapid population growth and urbanization, which led to overcrowded cities and rural depopulation.
- Liberals, radicals, and conservatives developed ideologies as a response to industrial and political revolutions.

For a full discussion of the Industrial Revolution, see Western Civilization, 8th and 9th editions, Chapter 20.

Factory Production

Mass production of goods in factories in the nineteenth century had three highly interdependent aspects: it used materials and labor efficiently, it exploited natural energy sources well, and it generously rewarded economic investment.

First, production was concentrated in one location. Materials and labor were brought to the factory to maximize the effectiveness of both. Factory owners got more out of their workers' time, especially in comparison with the cottage system. More goods could be produced in a factory than by the same number of workers in cottages.

Mass production depended on a division of labor and standardization of parts for the efficiencies that boost output. Division of labor involves one worker performing only one operation – the model in previous centuries had called for a craftsman with apprentices, each taking a product from inception to completion. Along with the division of labor, standardization of parts affected output. Factories specified a set size and shape for parts so they could be used interchangeably in the goods the factory produced. This increased productivity also made for a more economical use of raw materials as there was less waste in such a planned, standardized system.

A second aspect of mass production was the location of factories near sources of power. Early in the Industrial Revolution, work was often situated near a concentration of either labor or markets. As the revolution progressed, machinery driven by water power – for example, looms – required factories to be near rivers or streams. When the steam engine was invented in the 1760s, factories were built near the mines that provided the coal or coke for it. The steam engine would revolutionize factory production, greatly amplifying productivity. Because of this increased productivity, more workers were needed in factories. As a result, cities grew tremendously.

Finally, the backbone of factory production was great capital investment. The men who invested in industry gained impressive personal profit from their investments, which they reinvested in their businesses to buy the expensive factory buildings and machines. Without this large influx of capital, the Industrial Revolution could not have taken place.

These entrepreneurs led the development of a robust system of *laissez-faire* capitalism. Based on the economic theories expounded by Adam Smith a century earlier, it comprised five fundamental components: private ownership, free enterprise, profit motive, competition, and market economy.

The Industrial Revolution in Great Britain

Why Britain?

The greater productivity of the eighteenth-century cottage system and Agricultural Revolution put Great Britain in a position to lead Europe into a new age of rapid industrial growth. Agricultural changes – for example, new techniques such as crop rotation – led to the need for new tools, which encouraged early industrialists to create better farming implements. As new techniques and tools made the land more productive and enclosure of that land continued, fewer farm workers were needed. These displaced workers often moved from the countryside to towns in search of work. The increased productivity on farms provided the food necessary to support this rapid urban growth.

Britons supported the Industrial Revolution. The enclosure movement – the consolidation by large landowners of small, privately held lands – and the loss of commons had left a large number of people in need of new work. Britain had a group of skilled workers with the experience to design the machines that filled British factories. Britain also had entrepreneurs who were willing to take financial risks to start new businesses.

These entrepreneurs felt secure investing in Britain's industrial growth because of its strong economic state. Britain's mercantilist relationship with its colonies had given rise to a wealthy class of merchants who helped bankroll the factory system. The British trading network, strong and extensive, quickly located markets for the new factory-produced goods. Finally, Britain's well-organized, sound national banking system provided credit and economic stability, both of which were essential for ensuring the capital needed to buy the expensive machines mass production required.

A unified country with a stable, competent government, Great Britain provided the Industrial Revolution with a secure foundation. The parliamentary system gave greater voice to British subjects than many other European countries gave their citizens. The British government had also developed a solid infrastructure, especially good roads, which became part of the efficient British transportation system of the late eighteenth and early nineteenth centuries.

Finally, Great Britain had many geographic advantages. First, as an island it was exempt from many Continental disputes. Britain also had a number of great harbors that supported its worldwide trading network and numerous navigable rivers for transporting goods from inland factories to coastal harbors. In addition, the country was rich in mineral resources, including iron ore for machines and coal and coke to generate steam to power the machines.

Historical Causation is one of the most important thinking skills tested on the AP Exam. The reasons for the growth of the Industrial Revolution in Britain is a major theme in European history. Be sure you know the reasons and conditions the Industrial Revolution began in Britain rather than elsewhere.

British Technology

With excellent sources of raw cotton in India and the American South, Great Britain became a major producer of the world's woven cotton cloth, moving the textile industry from homes to factories. The spinning jenny, invented by James Hargreaves in 1764, the water-frame spinning machine patented by Richard Arkwright in 1768, and various machine-driven looms, coupled with the placing of factories by rivers as sources of power, greatly increased the output of workers. This increase eventually ended the cottage industry system.

The invention of the steam engine further transformed the production of textiles. With the steam engine as a source of power, factories no longer had to be situated near a river, and they could produce cotton cloth much faster than ever before. This created more demand for cotton, including more imported from India and the American South, and led to the sale of British textiles around the world.

The development of the iron industry also spurred industrial development in Britain. Not only was it used to manufacture the machines that were essential to factories, it was an industry in its own right, growing tremendously during the nineteenth century.

British Transportation

To move raw materials and finished products, new types of transportation were needed. Rivers had provided an effective way to move goods, but with the rapid growth of production and with factories no longer needing to be next to rivers for power, canals and railroads were constructed to provide more transportation connections.

By the end of the eighteenth century, canals linked factories to rivers, greatly facilitating trade. Goods could be moved more quickly and safely on canals than on roads. Canals also provided a more reliable method of moving materials across the country, because the transport of goods along roads could be slowed by bad weather.

The biggest revolution in transportation, however, was the railroad. By the beginning of the nineteenth century, railroads in Britain were powered by steam engines and could carry large loads faster and more cheaply than boats

in canals. The railroad eventually took on the major role of transporting goods in Britain.

This growth of British industrial might was clearly on display at the Great Exhibition of 1851. Held in London in the Crystal Palace, a huge glass and iron building set in Hyde Park, it brought together in one place many of the great machines of the day. There, along with the wonders of exotic lands around the world, the public could see the tremendous industrial power of the growing British factory system.

The Spread of Industrialization

The factory system that became so entrenched in Britain grew more slowly on the Continent. After the French Revolution and the Napoleonic Wars, most of the Continent was physically and economically devastated. Countries struggled just to rebuild their governments, financial systems, and manpower.

There were other obstacles on the Continent. Initially, there was little capital available to build the machines necessary to compete with Britain in a global market. In addition, guilds were stronger there than in Britain, and they worked against the development of industry; with industrialization, the guilds would lose their ability to monitor the quality of goods, a role that they had had for centuries. The Continental nations also did not have the network of good roads and ease of river transportation that supported the Industrial Revolution in Britain.

Finally, the British, eager to protect their edge, did not allow machines, skilled workers, or even plans for machines to leave the country. As industry developed in Britain, little of it moved to the Continent.

But as the nineteenth century progressed, France and Belgium began to grow as centers of industry. British factory workers who escaped their country's regulation of industry took plans for factories and machines with them, to the benefit of nations nearby. The French and Belgian governments put in place protectionist policies to help their fledgling industries grow. They set very high tariffs, taxes on imports, to keep out foreign manufactured goods, and provided the infrastructure – especially railroads – needed to carry both raw materials to factories and finished products to markets. The development of joint-stock banks also encouraged industrial growth in Continental Europe by providing the required capital. With the discovery of major concentrations of coal in Belgium and the German states, they eventually took the lead in manufacturing on the Continent.

Like Continental Europe, the United States was slow to begin industrializing, but by the mid-nineteenth century, it had embarked on a period of great industrial growth. With help from emigrating Britons, who brought their plans and their know-how, the United States built the workforce and infrastructure for an American Industrial Revolution that rivaled Europe's and England's by the end of the century.

The failure to industrialize in Eastern and Southern Europe was due to various factors, such as geography and lack of resources in some cases, and in other cases the continuation of serfdom and powerful landed political elites. As in the United States, where the North industrialized and the South stayed more agriculturally based with a system of slave labor doing the work on large plantations, Russian nobles kept serfdom and an agriculturally based economy alive until the 1860s.

The Social Impact of Industrialization

As industrialization spread across Europe, society changed in many ways. The interaction among the Enclosure Movement, the Agricultural Revolution, and the Industrial Revolution led to a tremendous population increase. Along with this came a growth of cities, as factories drew thousands of workers. Rapidly growing cities, such as Manchester, England, could not keep up with the demand for housing and infrastructure, including roads, sewage disposal, and police. With the overcrowding of workers came those who took advantage of them through a wide variety of crimes. Thus, these squalid living conditions led many reformers to push for public health improvements and public safety.

City life was substantially different from rural life. The old class of tradesmen that had flourished under the guild system no longer had the power it once held. As factories hired more and more workers, the importance of artisans diminished. Factory workers performed monotonous, repetitious, sometimes dangerous tasks. Women and children were employed in mines, as well as factories – indeed, prior to the Factory Act of 1833, women and children made up the majority of workers in British textile factories. This was a far cry from the old system of families working side by side on farms or in cottage industries.

Factory workers often went home to packed, unsanitary tenements. Soot from the factories blackened the buildings and tilled the air. Diseases such as typhoid and cholera swept through crowded cities, killing thousands. Those who survived were generally less healthy than those who worked in the countryside.

AP Tip

Social history is an important thread through all of European history. Be prepared to discuss the impact of the Industrial Revolution on society as a part of a continuum of how major social issues reflect their eras.

Responses to Problems of Industrialization

New ideologies competed with old ways of thinking about the problems of industrialization and what to do about them. Liberals tended to support the extension of the right to vote to factory owners and called for the right to run factories without government interference. Radicals in Great Britain, called republicans on the Continent, demanded universal male suffrage. Some argued that equal rights should be extended to women as well.

Throughout the nineteenth century, many people stepped forward to help workers. Fighting poor working conditions and technological unemployment (the loss of a job because a machine could perform the task), trade unions formed to protect both the quality of goods produced and the lives of the workers who produced them. Luddites, a group of skilled craftsmen, directly attacked and disabled the machines that brought factory workers not only unemployment but also boring, dangerous working conditions. The British Parliament passed several acts, including the Factory Acts of 1833 and 1847, that lowered the number of working hours allowed and raised the minimum working age. It also directly addressed the lives of working children, not only cutting the number of hours children could work but also requiring education for them. The Mines Act of 1842 took women and children out of the underground mining operations, although they still worked above ground.

Individuals and groups also tried to improve the lives of workers. Edwin Chadwick's three-year investigation into the living conditions of the working classes was published as the *Report on the Condition of the Labouring Population of Great Britain* (1842). It was the basis for his recommendation for building an adequate sewage system. *London: A Pilgrimage* (1872) brought together 180 engravings by Gustave Doré, a French artist. Many disliked the book because so many of the compelling images showed the grim world of the urban poor. Help for workers came in a different form with the Chartist movement, begun in 1838. Its goal was to help workers in their lives outside the factories. To that end, it pushed for universal male suffrage and the removal of property qualifications for members of Parliament as a way to provide social and economic improvements in Britain.

As factories ran more efficiently – often around the clock – there was greater demand for raw materials and a wider mass market. Responding to the accelerated demand, European nations were engaged in a fierce competition for colonies, especially in Africa and Asia, by the end of the nineteenth century. At the same time, a new philosophy developed: socialism. It offered a variety of ideas for building a new society able to deal with the problems of industrialization.

AP Tip

Don't think about just one class of people when you are studying for the exam. It is equally important to look at the impact of the industrial revolution on the wealthy elites as it is to concentrate on the poor working class. Factory owners could become enormously wealthy, rivaling and often surpassing the nobles, buying up land and building lavish homes in the country. They filled their city homes and country estates with the products they made and with things imported from all over the world. They had time for leisure activities and relationships within the family changed. However, if they did not run their businesses ruthlessly, they could go bankrupt and lose everything.