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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 to allow the creation of factories. Urban centers swelled as people left their rural homes and fields to make their livelihoods in cities.

KEY TERMS

capital	joint-stock investment bank
capitalism	Luddites
Chartist movement	mass production
entrepreneur	tariff
Great Exhibition of 1851	trade union
Industrial Revolution	

KEY CONCEPTS

- Britain's 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.

- In earlier movements, great minds produced great philosophies. During the Industrial Revolution, great minds created great machines that brought remarkable change and wealth first to Britain and, eventually, across the European continent.

For a full discussion of the Industrial Revolution, see *Western Civilization*, 7th and 8th 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; a tremendous growth of cities resulted.

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 the 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 would fill 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 could help bankroll the factory system. The British trading network, strong and extensive, would quickly locate markets for the new factory-produced goods. Finally, Britain's well-organized, sound national banking system could be depended on to provide 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 could provide 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.

AP Tip

The growth of the Industrial Revolution in Britain is a major theme in European history. Be sure you know the reasons why it began there 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 iron 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, 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.

However, the biggest revolution in transportation 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 GROWTH 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. They were not far away from those British factory workers who escaped their country's regulation of industry, taking plans and machines out of the country. 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 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.

Life in cities changed drastically. 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 filled 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.

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, which 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.

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.

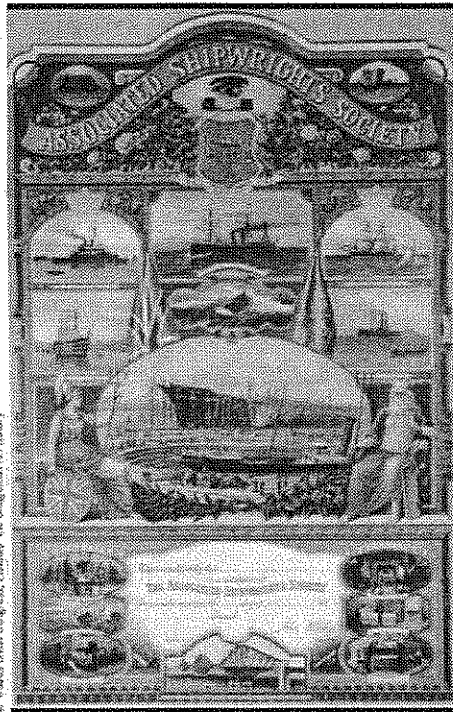
AP Tip

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.

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.

Multiple-Choice Questions

- All of the following were used to power machines EXCEPT
 - rivers
 - coal
 - coke
 - gasoline
 - streams
- Industry developed in nations outside Britain because
 - in the United States slavery was so extensive there were plenty of workers for factories
 - in Belgium high tariffs protected growing industries
 - in India the cotton industry was big enough that Indians built their own large textile industry
 - in France the king lowered taxes to build trade with other nations
 - the German states, through direct trade with Britain, gained unprecedented access to the most modern equipment
- The image to the right was created to
 - show the importance of British shipping in carrying products to a worldwide market
 - accentuate the significance of the British flag (the Union Jack) as a symbol of the British Empire
 - illustrate ancient sea gods and goddesses as symbols of maritime power in the nineteenth century
 - advertise a shipwright company and the various ways it could ship goods
 - show the various facets and benefits of a trade union



4. How did the Agricultural Revolution lead to the Industrial Revolution?
- (A) Its failure caused many workers to move from the cities to the farms, and thus led to a higher demand for farm tools, which the factories produced.
 - (B) The Agricultural Revolution caused the growth of industry because most of the wealth that supported the building of factories came from the large land-owning farmers.
 - (C) The most successful machines of the Industrial Revolution were invented by workers who had gained their ideas from what they had witnessed during the Agricultural Revolution.
 - (D) With the greater productivity of farms, many unemployed workers moved to cities to take jobs in factories, and the cities in turn had the food necessary to support the additional population.
 - (E) The taxation that came from the growth of agriculture allowed nations, especially Great Britain, to provide the necessary infrastructure for factories.
5. One of the major economic causes for British industrial success was
- (A) a sound banking system that provided necessary credit
 - (B) the creation of the pound as a separate currency from the euro in use on the Continent
 - (C) that the British government did not get involved in the country's economy
 - (D) Britain's strong trading relationship with the German states
 - (E) that her economy was already strong from a powerful trade among guilds
6. Which of the following describes the difference between the Luddites and the Chartists?
- (A) The Chartists used illegal means; the Luddites used legal means.
 - (B) The Luddites were violent whereas the Chartists were nonviolent.
 - (C) The Luddites worked on providing workers the right to vote; the Chartists focused on getting the vote for women.
 - (D) The Chartists fought to minimize working hours for children; the Luddites focused on improving working conditions for adults.
 - (E) The main difference between the two groups was that the Luddites were successful but the Chartists were not.

7. One of the main reasons the Industrial Revolution began in Great Britain was that
- (A) Parliament placed high taxes on merchants, which it used to build canals and railroads
 - (B) rivers could provide needed transportation
 - (C) Britain did not have to fight Napoleon, so it could focus on improving the lives of the people
 - (D) British workers were more motivated than Continental workers to make a profit
 - (E) Britain had a stable government that encouraged a strong economy
8. What was the most efficient system of transportation in Britain in the nineteenth century?
- (A) steam-powered railroad
 - (B) interconnected canals
 - (C) well-designed toll roads
 - (D) rivers that emptied into the sea
 - (E) streams that tied together the other modes of transportation
9. All of the following were true of entrepreneurs during the Industrial Revolution EXCEPT
- (A) they worked hard in the factories, providing the needed labor
 - (B) they were the financial backbone of factory production
 - (C) they made great profits and put them back into their businesses to continue to build wealth
 - (D) they offered an enormous capital investment
 - (E) they could afford to buy the factory buildings and expensive machinery
10. The effect of nineteenth-century technological developments in Britain included all of the following EXCEPT
- (A) cloth was produced more quickly
 - (B) children became desirable factory workers
 - (C) factories did not have to be near rivers or streams
 - (D) England produced sufficient iron for machines
 - (E) England began its first textile industry
11. The lives of urban factory workers were quite difficult for all of the following reasons EXCEPT
- (A) they lived in crowded, unsanitary tenements
 - (B) diseases could spread quickly and devastate large numbers of people
 - (C) factory work was highly repetitive and boring
 - (D) men and women—but not their children—worked in dangerous situations
 - (E) urban sanitation was poor

12. The Great Exhibition of 1851
 - (A) showed the British love of nature above all
 - (B) showed Britain's leading position during the Industrial Revolution
 - (C) was held in France to celebrate its first industrial use of the railroad
 - (D) exhibited machines from around the world
 - (E) was created by the king of England to honor a new alliance with France

13. A major component of the mass production in factories was
 - (A) the use of railroads
 - (B) the building of factories where the workers were most easily available
 - (C) the importance of having workers perform the same task repeatedly
 - (D) government support of all phases of production
 - (E) a similar revolution in agriculture

14. One of the main reasons the Industrial Revolution grew at a slower pace on the Continent than in Great Britain was that
 - (A) Belgian-manufactured goods were of lower quality than French goods
 - (B) the British sent only examples of their lower-quality machines to the Continent
 - (C) European countries' roads and river transportation were not as good as Britain's
 - (D) the economic devastation in France after the War of the French Succession made it too weak to support industrial advancement
 - (E) the guilds, which were very unpopular on the Continent, threw their support behind the development of industry in Belgium

15. What attributes of laissez-faire capitalism were key to the development of the Industrial Revolution?
 - (A) private ownership, free enterprise, profit motive, competition, and market economy
 - (B) group ownership, free enterprise, profit motive, competition, and domestic economy
 - (C) group ownership, free enterprise, profit motive, monopolies, and market economy
 - (D) private ownership, free enterprise, profit motive, competition, and domestic economy
 - (E) private ownership, free enterprise, profit motive, monopolies, and domestic economy

Free-Response Questions

1. Analyze the reasons why industrialization began in Britain rather than on the Continent.
2. In what ways did governments and reformers respond to the problems of industrialization?