

• AP European History
Unit 6 – The Industrial Revolution – Chapter 22 - Pages 829-856.

• The Industrial Revolution

- **Essay Question:** Analyze ways in which the Industrial Revolution altered the social fabric of European society.
- **DBQ:**
http://www.collegeboard.com/prod_downloads/ap/students/eurohistory/euro_hist_frq_02.pdf
- **Overview of the Industrial Revolution**
- **Machines began to replace significantly human and animal power in the production and manufacturing of goods.**
- **The use of the steam engine for producing textiles in the 1780s was the turning point.**
- **Europe gradually transitioned from an agricultural and commercial society into a modern industrial society.**
- **As late as the 1830s only a small fraction of British working people were employed in factories.**
- **By mid-19th century, industrialism had spread all across Europe.**
- **The economic changes of the “Industrial Revolution” did more than any other movement to revolutionize life in Europe and western civilization.**
- **Not since the development of agriculture during Neolithic times had there been such a radical change in society.**
- **Roots of the Industrial Revolution**
- **Commercial Revolution (1500-1700)**
- **Spurred great economic growth of Europe and brought about the Age of Exploration**
- **“Price Revolution” (inflation) stimulated production as producers could get more money for their goods.**
- **Bourgeoisie acquired much of their wealth from trading and manufacturing**
- **Rise of Capitalism**
- **Increased use of surplus money for investment in ventures to make a profit.**
- **The middle class came to provide the leadership for the economic revolution (e.g. chartered companies and joint-stock companies).**
- **Scientific Revolution produced the first wave of mechanical inventions and technological advances.**
- **Increase in Europe’s population provided larger markets**
- **Proto-industrialization: the Cottage Industry**
- **Rural industry was a major pillar of Europe’s growing economy in the 18th century**
- **Rural population eager to supplement its income**
- **Merchants in cities sought cheap rural labor rather than paying guild members in towns higher fees**
- **Thus, early industrial production was “put out” into the countryside: the “putting-out system”**
- **Manufacturing with hand tools in peasant cottages came to challenge the urban craft industry**
- **Cottage industry**
- **Merchant-capitalist would provide raw materials (e.g. raw wool) to a rural family who produced a finished or semi-finished product and sent it back to the merchant for payment**
- **Cottage workers were usually paid by the number of pieces they produced**
- **Merchants would sell the finished product for profit**
- **Wool cloth was the most important product**
- **The Cottage industry was essentially a family enterprise.**
- **Work of four or five spinners needed to keep one weaver steadily employed.**
- **Husband and wife constantly tried to find more thread and more spinners.**
- **Sometimes, families subcontracted work to others**

- **Problems with the cottage industry**
- **Constant disputes between cottagers and merchants occurred over weights of materials and quality of cloth.**
- **Rural labor was unorganized and difficult for merchants to control.**
- **Merchant-capitalists thus searched for more efficient methods of production resulting in growth of factories and the industrial revolution.**
- **Results**
- **Thousands of poor rural families were able to supplement their incomes**
- **Unregulated production in the countryside resulted in experimentation and the diversification of goods**
- **Goods included textiles, knives, forks, housewares, buttons, gloves, clocks and musical instruments**
- **The cottage industry flourished first in England**
- **Spinning and weaving of woolen cloth was most important**
- **In 1500, half of England's textiles were produced in the countryside; by 1700, that percentage was higher**
- **The putting-out system in England spread later to Continental countries (e.g. France and Germany)**
- **Proto-industrialism technology (prior to the steam engine)**
- **1733, John Kay: flying shuttle enabled weaver to throw shuttle back and forth between threads with one hand.**
- **Cut manpower needs on looms in half; only one person needed to operate a loom.**
- **1764, James Hargreaves invented the spinning jenny which mechanized the spinning wheel.**
- **Hand operated; simple and inexpensive.**
- **Early models had between six to 24 spindles mounted to a sliding carriage; each spindle spun thread.**
- **Usually worked by women who moved the carriage back and forth with one hand and turned a wheel to supply power with the other.**
- **Spinners now outpaced weavers (usually the husband).**
- **1769, Richard Arkwright invented the water frame, which improved thread spinning.**
- **Several hundred spindles on a machine required water power.**
- **Required large specialized factories that employed as many as 1,000 workers.**
- **Produced coarse, strong thread, which was then put out for re-spinning on hand-powered spinning jennies.**
- **1779, Samuel Crompton invented the spinning mule which combined the best features of the spinning jenny and the water frame.**
- **Resulted in all cotton spinning gradually being done in factories.**
- **England was the first country to industrialize**
- **Began in 1780s (not complete until 1830 at the earliest)**
- **Had no impact on continental Europe until after the end of the Napoleonic Wars (1815)**
- **Economic and Social factors**
- **Land and geography**
- **Geographic isolation from the Continent offered protection and separation from many of the continental wars**
- **Good supply of coal and iron**
- **Wales and Northern England important sources**
- **Foreign assistance not required**
- **Waterways offered a source of alternate power for factories and navigable transport for trade and communication.**
- **No part of England was more than 20 miles from navigable water.**
- **Much cheaper to ship goods by water than by land.**

- **Industrial Revolution grew out of England's expanding role in the Atlantic economy of the 18th century.**
- **The growth of the Royal Navy and the development of ports provided protection from foreign invasion and later aided Britain's commercial empire.**
- **Agricultural Revolution was vital to the Industrial Revolution.**
- **Supply of cheap and abundant labor emerged as the enclosure movement forced many landless farmers to move to towns and cities**
- **The revolution in agriculture made it possible for fewer farmers to feed larger numbers of people.**
- **British population doubled in the 18th century.**
- **Demand for goods within the country increased**
- **More people were freed up to work in factories (the industrial proletariat) or in the distribution of other goods and services**
- **People were free to move around in search of land or other forms of employment.**
- **Rural wage earners were relatively mobile**
- **Feudalism was reduced significantly and serfdom had long since been abolished**
- **Large supplies of capital were available due to over two centuries of profitable commercial activity**
- **England avoided many costly continental wars**
- **British merchants and gentry had prospered during the numerous wars on the continent.**
- **Establishment by the gov't of the Bank of England in 1694—the central bank**
- **Insurance companies, like Lloyd's of London, provided some degree protection from commercial failure.**
- **Entrepreneurs**
- **Class of inventive highly-motivated people who possessed technological skill and were willing to take risks.**
- **Many young men from the gentry undertook careers in business.**
- **Members of the middle class could rise into the nobility from the wealth created in business.**
- **Calvinists in the middle class were driven by the "Protestant work ethic"**
- **Colonial Empire**
- **Gave Britain access to raw materials needed for development of many industries.**
- **Growing market for English goods occurred in its colonies, buttressed by the African slave trade.**
- **Role of government**
- **Gov't was sympathetic to industrial development and well-established financial institutions were ready to make loans available.**
- **Limited monarchy meant that gov't did not stifle the growth and expansion of the middle class as was the case in French and Russian societies.**
- **Stable government**
- **Successful outcome of wars did not leave England devastated (as was the case with the Napoleonic Wars in Europe)**
- **Rise of the House of Commons became an instrument of the middle class to gain gov't cooperation and secured middle class loyalty.**
- **In contrast, the French middle classes had led revolutionary movements.**
- **Parliamentary legislation was favorable towards growth of industry.**
- **Bubble Act repealed which again allowed for the creation of joint stock companies.**
- **Lowes Act: Allowed for limited liability for business owners**
- **Repeal of the Navigation Acts and the Corn Laws decreased mercantilism's stifling effect in certain industries**
- **A growing demand for textiles led to the creation of the world's first large factories.**

- **Constant shortage of thread in the textile industry focused attention on ways of improving spinning.**
- **Inventions of proto-industrialization facilitated increased production**
- **The steam engine's application to textile production was perhaps the key event of the industrial revolution**
- **1780s, Richard Arkwright used the steam engine to power the looms and required factory production of textiles.**
- **1784, Edmund Cartwright invented a loom that was powered by horses, water, or steam.**
- **Metallurgical industries flourished as they provided the machinery**
- **Results of new technology**
- **By 1790, new machines produced 10X as much cotton yarn as in 1770.**
- **By 1800, production of cotton thread was England's most important industry.**
- **By 1850, England produced more than ½ world's cotton cloth.**
- **In 1820, cotton almost ½ of Britain's exports**
- **Cotton goods became much cheaper, and were enjoyed by all classes.**
- **Poor people could now afford to wear cotton slips and underwear.**
- **Steam engines and coal**
- **The use of coal to power steam engines was one of the hallmarks of the industrial revolution.**
- **This revolution in energy involved a transition from wood-burning to coal-burning.**
- **Prior to 1780, processed wood (charcoal) was the fuel mixed with iron ore in the blast furnace to produce pig iron.**
- **Much of England as well as parts of Europe were experiencing deforestation.**
- **Coal**
- **Provided steam power used in many industries.**
- **By 1850, England produced 2/3 of world's coal.**
- **The steam engine**
- **Thomas Savory (1698) and Thomas Newcomen (1705) invented the steam pump to pump water out of mines.**
- **Both engines were extremely inefficient.**
- **Used to replace mechanical pumps powered by animals**
- **James Watt in 1769 invented and patented the first efficient steam engine.**
- **By the late 1780s, the steam engine was used regularly in production in England.**
- **The steam engine was the most fundamental advance in technology.**
- **Steam-power began to replace water power in cotton-spinning mills during the 1780s as well as other mills (e.g. flour, malt and flint)**
- **Radical transformations occurred in manufacturing and transportation.**
- **The iron industry was radically transformed by steam power.**
- **Rising supplies of coal boosted iron production and gave rise to heavy industry: the manufacture of machinery and materials used in production**
- **Iron makers switched over rapidly from charcoal to coke in smelting of pig iron.**
- **Henry Cort, in 1780s, developed the puddling furnace, which allowed pig iron to be refined in turn with coke.**
- **Cort also developed heavy-duty steam-powered rolling mills capable of shaping finished iron into any shape or form.**
- **By 1850, England produced more than half of world's iron.**
- **Transportation Revolution**
- **Made possible by steam power.**
- **Necessary to distribute finished goods as well as deliver raw materials to factories.**
- **New canal systems**
- **Duke of Bridgewater important in development.**

- Canals important in completing basic needs of related interdependent industries: railroad, steel, coal industries
- Construction of hard-surfaced roads pioneered by John McAdam (1756-1836)
- Significantly improved land travel
- 1807, Robert Fulton's steamboat, the *Clermont*, traveled up the Hudson River from New York City to Albany.
- Used an imported Boulton and Watt steam engine.
- Made 2-way river travel possible and travel on the high seas faster.
- 1838, first steamship crossed the Atlantic Ocean.
- Railroad
- 1803, first steam wagon was used on streets of London
- 1812, steam wagon was adapted for use on rails.
- 1825, George Stephenson made railway locomotive commercially successful.
- By 1829, the locomotive was widely used in England.
- In 1830, his locomotive, the Rocket, traveled the Liverpool-Manchester Railway at 16mph.
- World's first important railroad as it was in heart of industrial England.
- Many private companies were quickly organized to build more rail lines in the 1840s
- Impact of the railroad:
- Greatly reduced cost of shipping freight on land
- Resulted in growing regional and national market spurring increased industrial productivity to meet larger demand.
- Facilitated the growth of urban working class who came from the countryside.
- Many cottage workers, farm laborers, and small peasants worked building railroads.
- After rail lines were built, many traveled on railroads to towns looking for work.
- Great Britain in 1850
- Produced 2/3 of world's coal.
- Produced more than 1/2 of world's iron.
- Produced more than 1/2 of world's cotton cloth.
- GNP rose between 1801 and 1850 350%
- 100% growth between 1780 and 1800.
- Population increased from 9 million in 1780 to almost 21 million in 1851.
- Per capita income increased almost 100% between 1801 and 1851.
- Economy increased faster than population growth creating higher demand for labor.
- The Crystal Palace was built for the 1851 international exhibit.
- It was intended to signify Britain's industrial, economic and military power.
- It is about 1/3 mile long and about 800,000 square feet inside the structure.
- Continental Europe began to industrialize after 1815.
- Parts of the Continent were not far behind Britain industrially in the 1780s.
- Cottage industry thrived in certain regions
- Some British manufacturing techniques were copied by certain Continental countries
- The Napoleonic wars hindered the industrial growth of continental European nations.
- Disrupted trade, created runaway inflation, and reduced consumer demand.
- Continental access to British machinery and technology was reduced.
- By 1815, the continental countries lagged much further behind industrially than in 1789.
- Britain dominated world markets during the wars.
- British technology too advanced for most continental engineers and skilled technicians to understand.
- Technology of steam power was expensive and required large amounts of capital.
- Continental entrepreneurs struggled to acquire large amounts of capital.
- Shortage of factory workers.
- Landowners and gov't officials did little to encourage industrial growth.

- After 1815, continental Europe began catching up to Britain
- Studied Britain's costly mistakes during early industrialization and avoided them.
- Industrialization differed in each country after 1815
- Belgium, Holland, France, and U.S. began their industrial revolutions in the 2nd decade of the 19th century.
- Germany, Austria, and Italy in mid-19th century.
- By 1900, Germany was the most powerful industrial country in Europe
- Eastern Europe and Russia industrialized near the end of the 19th century.
- Borrowed British technology, hired British engineers, and gained British capital.
- Used power of strong sovereign central governments and banking systems to promote native industry.
- Belgium: in 1830s, pioneered the organization of big corporations with many stockholders.
- Banks used money to develop industries and thus became industrial banks.
- Banks in France and Germany became important in the 1850s in developing railroads and companies in heavy industries.
- Cr dit Mobilier of Paris was the most famous.
- Helped build railroads all over France and Europe.
- Britain was unsuccessful in maintaining a monopoly on technical advances.
- Until 1825, it was illegal for artisans and skilled mechanics to leave Britain.
- Until 1843, export of textile machinery and other equipment forbidden.
- Yet, many emigrated illegally and introduced new methods abroad.
- Tariff policies were used to protect native industries on the continent.
- France responded by enacting high tariffs on many British imports.
- France had been flooded by inexpensive and superior British goods
- 1834, the *Zollverein* was a German tariff on non-German imports established to encourage capital investment in German industry
- Established a free trade zone among member states and a single uniform tariff was levied against foreign countries.
- Most significant result was increased production and availability of manufactured goods.
- Social implications of the Industrial Revolution.
- Replaced the traditional social hierarchy with a new social order.
- 19th century became the golden age of the middle class.
- A new class of factory owners emerged in this period: the bourgeoisie.
- Two levels of bourgeoisie existed:
- Upper bourgeoisie: great bankers, merchants and industrialists who demanded free enterprise and high tariffs.
- Lower bourgeoisie ("petite bourgeoisie"): small industrialists, merchants, and professional men who demanded stability and security from the government.
- New opportunities for certain groups emerged.
- Artisans and skilled workers who were highly talented achieved significant success.
- Certain ethnic and religious groups became successful
- Quakers and Scots in England.
- Protestants and Jews dominated banking in Catholic France.
- As factories grew larger, opportunities for advancement declined in well-developed industries.
- Capital-intensive industry made it harder for skilled artisans to become wealthy manufacturers
- Formal education thus became more important as a means of social advancement (but the cost was often prohibitive to those below the middle class)
- In England by 1830 and Germany in 1860, leading industrialists were more likely to have inherited their businesses.
- Proletariat wage earners

- **Factory workers emerged as a new group in society and the fastest-growing social class: the “proletariat”**
- **During the first century of the industrial revolution a surplus of labor resulted in poor conditions for workers.**
- **Hours in factories as much as 14 hours a day, occasionally more; few holidays.**
- **Working conditions were often brutal and unsafe**
- **Low wages, particularly for women and children**
- **Poorhouses emerged to provide work to those who were unemployed**
- **Poorhouse conditions were often intentionally oppressive.**
- **A major goal was to persuade workers to leave the poorhouse and find work elsewhere**
- **Friedrich Engels (1820-1895) lashed out at the middle classes in his *The Condition of the Working Class in England* (1844).**
- **Future revolutionary and colleague of Karl Marx who believed the capitalist middle class ruthlessly exploited the proletariat**
- **“I charge the English middle classes with mass murder, wholesale robbery, and all the other crimes in the calendar.”**
- **His ideas influenced Marx and later socialists.**
- **The issues of working conditions, wages, and quality of life led to struggles between labor and capital.**
- **For workers and ordinary families, the long-term impact of the Industrial Revolution was more favorable than negative.**
- **Significant advancement from pattern of pre-industrial life**
- **Material prosperity in England increased due to availability of cheaper high-quality goods and because increased consumption led to more jobs.**
- **Wages:**
- **Between 1820 and 1850, real wages and consumption of the average worker rose by almost 50%.**
- **Only 5% between 1780 and 1820.**
- **Skilled British workers earned about twice that of unskilled workers in agriculture.**
- **However, the average work week increased**
- **Workers ate better and quality and quantity of clothing improved**
- **Housing did not improve for working people and in fact, may have deteriorated somewhat.**
- **Until 1850, workers as a whole did not share in the general wealth produced by the Industrial Revolution.**
- **Economic conditions of European workers improved after 1850.**
- **Luddites**
- **A violent group of irate workers who blamed industrialism for threatening their jobs**
- **Beginning in 1812 and continuing thereafter, attacked factories in northern England destroying new machines they believed were putting them out of work.**
- **Union Movement**
- **Certain leaders began organizing groups of workers to resist exploitation of the proletariat by business owners**
- **Combination Acts (1799)**
- **Parliament prohibited labor unions**
- **Reaction to fear of radicalism in the French Revolution.**
- **Widely disregarded by workers.**
- **Repealed in 1824 and unions became more tolerated after 1825.**
- **Robert Owen (1771-1858) in 1834, organized the Grand National Consolidated Trades Union.**
- **Scottish industrialist who pioneered industrial relations by combining firm discipline with a concern for the health, safety, and work hours of workers.**
- **After 1815, experimented with utopian cooperative/socialist communities**

- His and other unionization efforts failed and British labor movement moved once again after 1851 in the direction of craft unions.
- Craft unions won benefits for their members.
- Means were fairly conservative and became accepted part of industrial scene.
- Chartists sought political democracy.
- Organized in the face of Owen's national trade union collapse.
- Demanded that all men have the right to vote.
- Sought to change what they saw as an oppressive economic system of exploitation.
- Unions campaigned for 10 hour days and to permit duty-free imports of wheat into Britain to secure cheap bread (in response to the oppressive Corn Laws that were passed in 1815).
- Union action, combined with general prosperity and a developing social conscience, led to improved working conditions, better wages, and reduced work hours.
- Skilled labor benefited earlier and to a larger extent than unskilled labor.
- Changes in working conditions
- Factory work meant more discipline and lost personal freedom.
- Work became impersonal
- Cottage workers reluctant to work in factories even for decent wages because the environment was so different from what they were used to.
- Early factories resembled English poorhouses, where destitute people went to live on welfare.
- Some poorhouses were industrial prisons
- Child labor exploitation.
- Causes for increased child labor
- More agricultural workers became weavers as they were paid relatively well.
- English factories scared off many potential workers as they resembled the poorhouses.
- Factory owners thus turned to child labor.
- Abandoned children became a main source of labor from local parishes and orphanages.
- Owners exercised authority over children much like slave-owners.
- Work hours were very long and conditions were appalling.
- Children worked as chimney sweeps, market girls, shoemakers, etc.
- Child exploitation was not new, however.
- Children were doing much of same work they did traditionally in the cottage industry.
- Conditions in factories only appeared worse.
- Child labor was actually coming to an end as the industrial revolution matured.
- Children & parents typically worked 12 hour days
- Many families were unwilling to allow their family members to be separated.
- Families came as a unit to work the mills and mines.
- Working together made working long hours more tolerable.
- In cotton mills, children worked for mothers or fathers, collecting waste and "piecing" broken thread together.
- In the mines, children sorted coal and worked ventilation equipment.
- Mothers hauled coal in narrow tunnels to the surface.
- Fathers mined the seam.
- Adult workers not necessarily eager to limit minimum working age or hours of their children, as long as they worked together.
- Yet, parents did protest inhumane treatment of their children
- Parliament sought to limit child labor.
- The Sadler Commission investigated working conditions helped initiate legislation to improve conditions in factories.
- Factory Act of 1833:
- Limited workday for children ages 9-13 to 8 hrs. per day
- Limited hours of ages 14-18 to 12 hours.

- Prohibited hiring children under age 9; children were to go to elementary schools factory owners were required to establish
- Ironically, helped destroy the pattern of families working together.
- Employment of children declined rapidly.
- Mines Act of 1842:
- prohibited all boys and girls under age 10 from working underground.

- **Social Effects of Industrialization**
- Urbanization was the most important sociological effect.
- Largest population transfer in human history.
- Birth of factory towns; cities grew into large industrial centers: e.g. Manchester
- Prior to the industrial revolution, most people lived in the south of England.
- Coal and iron located in the Midlands and north
- 1785, only 3 cities with more than 50,000 people existed in England and Scotland.
- By 1820, 31 British cities had 50,000 or more.
- Role of the city changed in the 19th century from governmental and cultural centers, to industrial centers.
- Although living conditions did not differ much from those on farms, the concentration of the population made them appear worse.
- Workers began to unite for political action, to remedy their economic dissatisfaction.
- Reformers sought to improve life in cities
- Working class injustices, gender exploitation and standard-of-living issues became the 19th century's great social and political dilemmas.
- Family structure and gender roles within the family were altered.
- Families as an economic unit were no longer the chief unit of both production and consumption
- New wage economy meant that families were less closely bound together than in the past.
- Productive work was taken out of the home
- As factory wages for skilled adult males rose, women & children were separated from the workplace.
- Gender-determined roles at home and domestic life emerged slowly.
- Married women came to be associated with domestic duties, while men tended to be the sole wage earner.
- Women were now expected to create a nurturing environment to which the family members returned after work.
- Married women worked outside the home only when family needs, illness or death of a spouse required them to do so.
- Single women and widows had much work available, but that work commanded low wages and low skills and provided no way to protect themselves from exploitation.
- Irish workers increasingly came to Great Britain and became urban workers.
- Many Irish were forced out of rural Ireland by population growth and increasingly poor economic conditions.
- The Industrial Revolution may have stemmed human catastrophes resulting from population growth.
- Overpopulation and rural poverty most severe in Ireland.
- Ireland did not industrialize in 19th century and stands as an example of what may have occurred in other parts of Europe.
- Irish Potato Famine
- Most of the population was Irish Catholic peasants.

- Rented land from a tiny minority of Anglicans, many of whom lived in England.
- Most lived in abject poverty around 1800.
- Protestant landlords did not improve agriculture in Ireland.
- Disease in potato crop continued to increase along with accompanying fever epidemics.
- In 1845 & 46 and again in 1848 & 1851, the potato crop failed in Ireland and much of Europe.
- Higher food prices, widespread suffering, and social unrest ensued.
- Result of the Great Famine
- At least 1.5 million people died or went unborn.
- 1 million fled Ireland between 1845 and 1851; 2 million left between 1840 and 1855.
- Most went to U.S. or Britain.
- By 1911, Irish population only 4.4 million compared with 8 million in 1845.
- British government response to crisis inadequate.
- Rapid population growth, as in Ireland, without industrialization may have led to similar results in other parts of Europe as in Irish potato famine.
- e.g. Central Russia, western Germany, and southern Italy were vulnerable: overpopulation, acute poverty, and reliance on the potato.
- A historical debate on the industrial revolution
- Capitalists view it as a positive step toward fulfilling human wants and needs.
- The Industrial Revolution provided power to replace back-breaking human labor.
- Wealth available for human consumption increased.
- Vast amounts of food, clothing and energy were produced and distributed to the workers of the world.
- Luxuries were made commonplace.
- Life-expectancy increased
- Leisure time made more enjoyable.
- Human catastrophe, like Ireland, was largely avoided in areas experiencing industrialization.
- Socialists and communists view it as the further exploitation of the have-nots by the haves.
- Workers did not begin to share in dramatic increase in standard of living until 2nd half of 19th century due to low wages, poor working conditions, etc.
- During 1st century of industrialism the wealth created went almost exclusively to the entrepreneur and the owner of capital—the middle class.