Chapter Summary

Section 1: The Industrial Revolution Spreads

The Industrial Revolution spread from Great Britain to the other countries of Western Europe and the United States. Its second phase was marked by a wave of inventions, including the light bulb and internal combustion engine.

Section 2: The Rise of the Cities

As the general population increased due to better nutrition and advances in medicine, many people crowded into growing cities. Cities offered jobs and excitement. People struggled for better working conditions at this time, and some progress was made.

Chapter Summary (continued)

Section 3: Changing Attitudes and Values

The rise of the middle class led to the cult of domesticity. Some rebelled and sought greater rights for women. Attitudes and values also shifted due to scientific breakthroughs that challenged traditional beliefs.

Section 4: Arts in the Industrial Age

Life in the industrial age gave rise to a movement in the arts known as romanticism, which expressed freedom and elevated emotion. In response, realism also emerged at this time. Photography gave rise to impressionism and postimpressionism in the visual arts.

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Life in the Industrial Age: Interview

Chapter Review

Life in the Industrial Age (1800–1914)

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Objectives

- List the industrial powers that emerged in the 1800s.
- Describe the impact of new technology on industry, transportation, and communication.
- Understand how big business emerged in the late 1800s.

Terms and People

- **Henry Bessemer** – a British engineer who developed a new process for making steel from iron in 1856
- **Alfred Nobel** – a Swedish chemist who invented dynamite in 1866
- **Michael Faraday** – an English chemist who created the first electric motor in the 1800s
- **dynamo** – a machine that is used to generate electricity

Terms and People (continued)

- **Thomas Edison** – the American inventor who made the first electric light bulb in the 1870s
- **interchangeable parts** – identical components that could be used in place of one another in manufacturing
- **assembly line** – production method that breaks down a complex job into a series of smaller tasks
- **Orville and Wilbur Wright** – American bicycle makers who designed and flew an airplane in 1903, ushering in the air age

Terms and People (continued)

- **Guglielmo Marconi** – an Italian inventor who developed the radio in the 1890s
- **stock** – shares of a company
- **corporation** – business owned by many investors who buy shares of stock and risk only the amount of their investment
- **cartel** – a group of companies that join together to control the production and price of a product

How did science, technology, and big business promote industrial growth?

The Industrial Revolution entered a second phase by the mid-1800s.

New industrial powers and products emerged. Giant companies arose due to changes in business organization. This second phase transformed Western economies.

Great Britain was the first nation to industrialize. It tried to protect this head start by making rules against exporting inventions.

Nevertheless, a British mechanic opened factories in Belgium in 1807, making that country the second to industrialize.

By the mid 1800s, other nations in Europe—as well as the United States—caught up to Britain in the race to industrialize.

Germany, France, and the United States caught up to Britain quickly.

They benefited from having abundant supplies of natural resources.

Europe and the United States also borrowed British technology.

Germany, which united into one nation in 1871, became Europe's leading industrial power. The United States also advanced rapidly after the Civil War.

Centers of industry were scattered across Europe and the United States by 1871.

The world industrialized unevenly.

- The nations of eastern and southern Europe industrialized slowly. They lacked natural resources, capital, or ideal political conditions.
- However, Japan, Canada, Australia, and New Zealand all industrialized during the late 1800s and built thriving economies.

The effects of industrialization were both positive and negative.

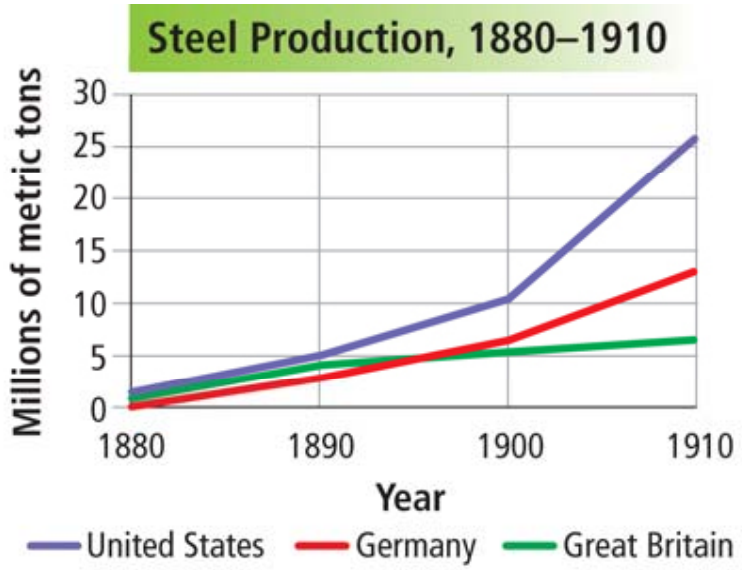
- People worked very long hours in dangerous factories.
- But new goods became widely available at low prices.

Patterns of world trade changed. → Western powers grew to dominate the world.

William Kelly and Henry Bessemer invented a new process for making steel.

Because steel was so cheap and strong, it became the main material used to make tools, bridges, and railroads.

Henry Bessemer patented his process in 1856, and steel production soared.



Innovations in chemistry and electricity changed how industry operated in the late 1800s.

Inventor	Major invention	Year
Alfred Nobel	Dynamite	1866
Michael Faraday	First simple electric motor and the **dynamo**	Late 1800s
Thomas Edison	Electric light bulb	1870s

New methods of production improved efficiency in factories.

- Manufacturers designed products with **interchangeable parts.**
- Workers on an **assembly line** added these parts to the product as it moved along a belt through the factory.

As goods were produced more quickly and cheaply, their prices decreased.

Transportation was transformed during the Industrial Revolution.

- Transcontinental railroads linked cities together. Automakers such as Nikolaus Otto, Karl Benz, Gottlieb Daimler, and Henry Ford changed the way people traveled by using gasoline, the international combustion engine, and the assembly line.
- The internal combustion engine also made sustained flight possible. **Orville and Wilbur Wright** flew the first airplane at Kitty Hawk in 1903.

The revolution in communication made the world seem smaller.

Inventor	Major invention	Year
Samuel Morse	Telegraph	1844
Alexander Graham Bell	Telephone	1876
Guglielmo Marconi	Radio	Late 1890s

Big business began to dominate industry in the late 1800s.

- Company owners sold **stock** to investors to get the capital, or money, needed to invest in new technology.
- Companies became **corporations,** businesses owned by many stockholders.

Business leaders created monopolies and cartels in their pursuit of profit.

This created a debate between those who saw big business as positive and those who viewed it negatively. Reformers called for laws to break up monopolies and regulate corporations.

Section Review

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Objectives

- Summarize the impact of medical advances in the late 1800s.
- Describe how cities had changed by 1900.
- Explain how working-class struggles led to improved conditions for workers.

Terms and People

- **germ theory** – the idea that certain microbes cause specific infectious diseases
- **Louis Pasteur** – a French chemist who showed the link between microbes and disease and developed vaccines against rabies and anthrax
- **Robert Koch** – a German doctor who identified the bacterium that caused tuberculosis
- **Florence Nightingale** – an army nurse in the Crimean War who worked to introduce sanitary measures in British hospitals and founded the world's first school of nursing

Terms and People (continued)

- **Joseph Lister** – the English surgeon who discovered how antiseptics prevent infection
- **urban renewal** – the process of fixing up the poor areas of a city
- **mutual-aid society** – a self-help group formed to aid sick or injured workers
- **standard of living** – a measure of the quality and availability of necessities and comforts in a society

How did the Industrial Revolution change life in the cities?

Cities grew during the 1800s as rural people moved into urban areas and the population continued to grow due to medical advances.

Cities began to take on many of the features that they have today.

Populations soared in Europe and America between 1800 and 1900 because the death rate fell.

This resulted from improved nutrition and significant advances in medicine.

In 1870, **Louis Pasteur** proved **germ theory,** that microbes cause specific illnesses. As people improved their hygiene, the rate of disease decreased.

Hospital care also improved during the 1800s and early 1900s.

- Anesthesia was first used in the 1840s and allowed doctors to experiment with new operations.
- However, hospitals were dangerous places before people understood the importance of sanitation. **Florence Nightingale** and **Joseph Lister** worked to change this and drastically reduced deaths from infection.

Cities experienced big changes as industrialization progressed.

- City planners led **urban renewal** projects.
- Settlement patterns changed as the rich moved to the outskirts of cities and the poor lived in slums at the center.

Cities became safer. → Electric street lights lit up the night and cities organized police forces.

Use of electricity continued to grow in the twentieth century.

Electricity Customers in England and Wales

Year	Customers in Millions
1920	0.9
1930	3.5
1940	9.6
1950	12.0
1960	15.5
1970	18.3
1980	20.3

SOURCE: Department of Trade and Industry, United Kingdom

Electric Generation Stations

Country	Year	Number of Stations
Russia	1913	220
Germany	1913	4,040
Great Britain	1912	568
Sweden	NA*	440
United States	1912	5,221

*NA Not available
SOURCE: *The Electrification of Russia, 1880–1926*

Sewers made cities healthier and steel skyscrapers made them taller.

Despite these improvements, poor people lived in bad conditions in slums.

On the whole, however, cities were very attractive. People were drawn by the excitement, the promise of work, and entertainment.

Workers tried to improve their living conditions. By the mid 1800s they began to see progress.

- They formed **mutual-aid societies** to help sick or injured members.
- Union membership grew and workers used strikes to demand wage increases.
- Government also responded to pressure and passed laws to regulate working conditions and ban child labor.

The standard of living rose among workers.

People had more time for leisure activities such as going to the movies.

People ate better and dressed in mass-produced clothing. Health improved, and some workers moved to the suburbs.

The Causes and Effects of the Industrial Revolution

Cause and Effect

Causes

- Increased agricultural productivity
- Growing population
- New sources of energy, such as steam and coal
- Growing demand for mass-produced goods
- Improved technology
- Available natural resources, labor, and money
- Strong, stable governments

Industrial Revolution

Immediate Effects

- Rise of factories
- Changes in transportation and communication
- Urbanization
- New methods of production
- Rise of urban working class
- Growth of reform movements

Long-Term Effects

- Growth of labor unions
- Inexpensive new products
- Increased pollution
- Rise of big business
- Expansion of public education
- Expansion of middle class
- Competition for world trade
- Progress in medical care

Section Review

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Objectives

- Explain the values that shaped the new social order.
- Understand how women and educators sought change.
- Learn how science challenged existing beliefs.

Terms and People

- **cult of domesticity** – a message put forth by books, magazines, and popular songs that idealized women and the home
- **temperance movement** – a campaign to limit or ban the use of alcoholic beverages
- **Elizabeth Cady Stanton** – a reformer who helped organize a movement for women's rights
- **women's suffrage** – women's right to vote

Terms and People (continued)

- **Sojourner Truth** – an African American suffragist
- **John Dalton** – an English Quaker schoolteacher who developed modern atomic theory in the early 1800s, showing that each element has its own kind of atoms
- **Charles Darwin** – the British naturalist who in 1859 published *On the Origin of Species,* in which he set forth the theory of evolution through natural selection

Terms and People (continued)

- **racism** – the belief that one racial group is superior to another
- **social gospel** – a movement that urged Christians to social service

How did the Industrial Revolution change the old social order and long-held traditions in the Western world?

The Industrial Revolution brought challenges to the social order in the Western world.

These challenges included demands for women's rights, the rise of the middle class, and breakthroughs in science.

Prior to the Industrial Revolution, there were only two main social classes: nobles and peasants. This changed in the 1800s.

Three social classes emerged by the late 1800s.

1. The new upper class, a mix of aristocrats and wealthy entrepreneurs
2. The growing middle class and lower middle class
3. Workers and peasants

The modern middle class developed its own tastes and values, and the role of women changed.

- A code of etiquette guided behavior, child-rearing, and dress.
- Women had previously helped to run family businesses, but now men went off to work.
- A **cult of domesticity** emerged to encourage women to stay home.

Some women worked to change the restrictions placed upon them.

- They sought fairness in marriage, divorce, and property laws.
- Many women's groups also supported the **temperance movement.**

The struggle for political rights, including **women's suffrage,** posed the biggest challenge.

Elizabeth Cady Stanton and **Sojourner Truth** were two of the leaders of the movement.

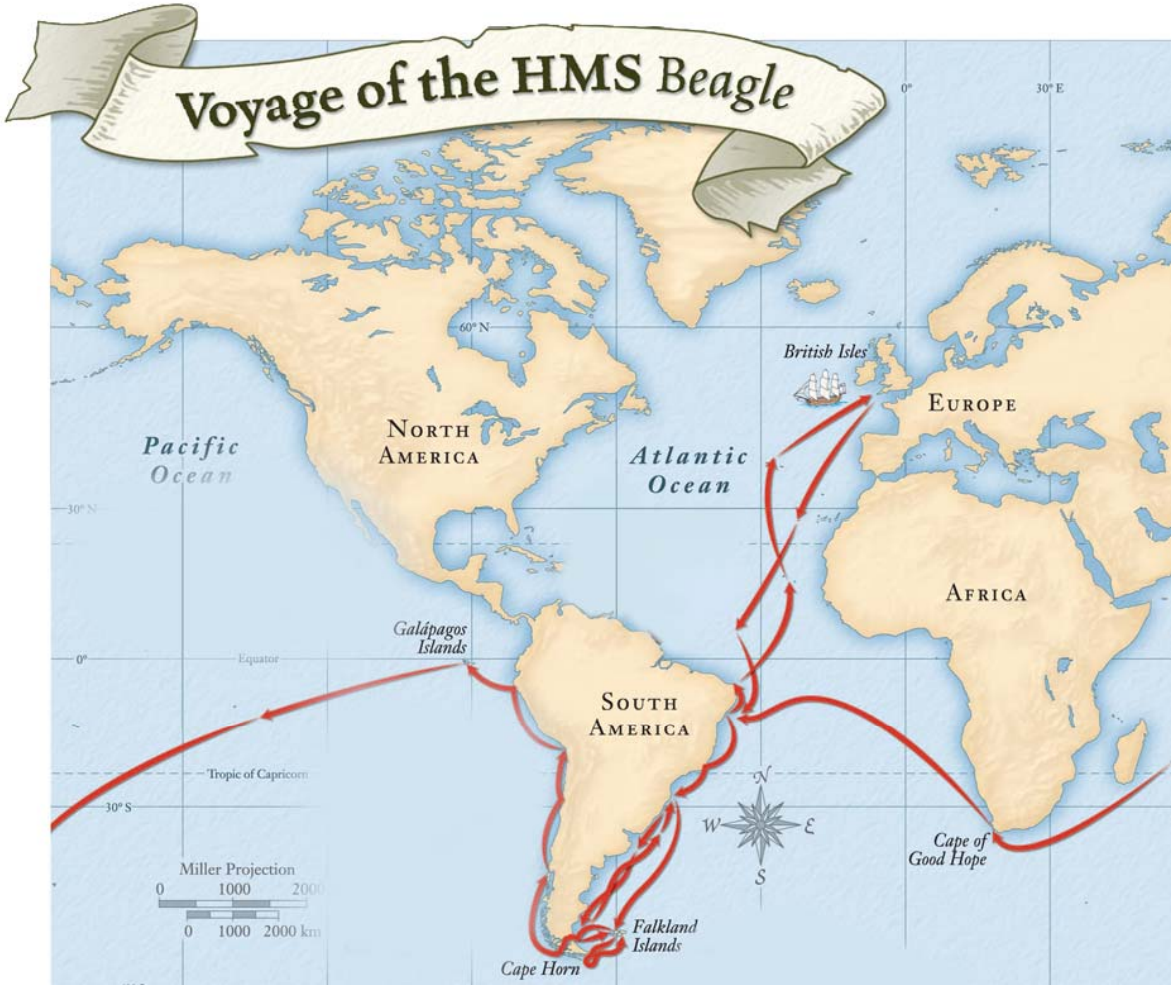
Many governments set up public schools by the late 1800s.

- Industrialized societies needed literate workers.
- Education was different for boys and girls, with few girls receiving training in science or math.

Universities expanded at this time, and reformers sought greater educational opportunities for women.

Scientists challenged long-held beliefs.

Scientist	Breakthrough
John Dalton	Showed that each element has its own kind of atoms.
Charles Lyell	Showed that the Earth had formed over millions of years.
Charles Darwin	In his book *On the Origin of Species,* explained how species could evolve through natural selection.



Darwin's theory of evolution grew out of observations he made while traveling on the HMS *Beagle*.

Some people used Darwin's theory of natural selection to support their own beliefs about society.

- Social Darwinists, for example, contended that industrial tycoons were more "fit" than those they put out of business.
- Some argued that victory in war or business was proof of superiority, a view that encouraged **racism.**

Religion continued to be a major force in society at this time.

- Church groups and Jewish organizations pushed for reforms to help the working poor, and some churches opened schools.
- Many religious leaders promoted the **social gospel,** which urged Christians to social service.

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Objectives

- Understand what themes shaped romantic art, literature, and music.
- Explain how realists responded to the industrialized, urban world.
- Describe how the visual arts changed.

Terms and People

- **William Wordsworth** – a poet, part of the romantic movement
- **William Blake** – a poet and writer who contributed to the romantic movement
- **romanticism** – 19th-century artistic movement that appealed to emotion rather than reason
- **Lord Byron** – a British poet who wrote about moody, isolated, and romantic heroes
- **Victor Hugo** – a French novelist who recreated his country's past in novels such as *The Hunchback of Notre Dame*

Terms and People (continued)

- **Ludwig van Beethoven** – a romantic German composer whose music combined classical forms with a stirring range of sound
- **realism** – an attempt to represent the world as it was, without the sentiment associated with romanticism
- **Charles Dickens** – an English novelist who portrayed the lives of slum dwellers and factory workers in his books
- **Gustave Courbet** – a French realist painter who depicted what he saw in his works

Terms and People (continued)

- **Louis Daguerre** – a French inventor who improved on earlier technologies to produce successful photographs by the 1840s
- **impressionism** – a style of art in which painters attempted to capture the first fleeting impression made by a scene or object
- **Claude Monet** – an impressionist artist who applied colors without combining them, relying on the human eye to blend them
- **Vincent van Gogh** – a postimpressionist painter who experimented with sharp lines and bright colors

What artistic movements emerged in reaction to the Industrial Revolution?

A cultural movement called **romanticism** emerged out of the Industrial Revolution and flourished between 1750 and 1850.

It emphasized imagination, freedom, and emotion.

Romanticism glorified nature and communicated intense feelings.

This artistic style emerged in the mid 1700s and was a reaction to neoclassicism, which focused on reason and restraint.

Romantic writers created a new kind of hero.

Lord Byron was known for creating isolated, larger-than-life characters in his poetry.

His hero was often mysterious and different from others in society.

Two other examples of this sort of character were Goethe's Faust and Charlotte Brontë's Rochester in her novel *Jane Eyre.*

Some romantics found inspiration in the past.

Victor Hugo wrote about France's past in *The Hunchback of Notre Dame.*

Architects built new structures in the medieval Gothic style. The buildings of the British Parliament are an example of this.

Romantic composers and artists stirred deep emotions.

- **Ludwig van Beethoven** took advantage of all the instruments in the orchestra to produce a stirring range of sound.
- Landscape painters such as J. M. W. Turner tried to show the power of nature in their work with bold color.

A new artistic movement called realism emerged in the mid-1800s.

Realists sought to depict life as it really was, and often focused on the harsh side of existence.

Charles Dickens portrayed the lives of slum dwellers and orphans in his popular novels, and Émile Zola wrote of class warfare in his work.

Realism also emerged in drama and in art.

- Henrick Ibsen produced plays attacking hypocrisy and strict social rules.
- **Gustave Courbet** painted rough laborers in his works.

As photography emerged, painters took new directions in their work.

- **Louis Daguerre** improved on earlier technology to produce photographs by the 1840s.
- Since the camera could be used to realistically depict life, painters faced the challenge of what to do next. **Impressionism** evolved as a result.

Impressionist painters sought to capture an "impression" of an object or a scene.

- Unlike earlier artists, **Claude Monet** and other impressionists did not attempt to hide their brush strokes.
- These artists attempted to create a fresh view of the world.
- Postimpressionists, such as **Vincent van Gogh,** experimented further with line and color to add a dreamlike quality to images in their work.

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