



CHAPTER 19

The Growth of Industry

1865–1914

Why It Matters

Innovations in technology and new business combinations helped the United States develop into a great industrial power. By the year 1900, United States industrial production was the greatest in the world.

The Impact Today

Innovations in technology and economics have transformed national and regional economies into a global economy. Developments in transportation and communications have made international trade an economic driving force in today's world.



The American Journey Video The chapter 19 video, "The Builders of Our Railroads," examines the life and hardships that immigrants faced as workers on the railroads.

1869

- First transcontinental railroad completed

1870

- Rockefeller organizes Standard Oil Company

1886

- Trade unions form AFL

1876

- Bell patents the telephone

1879

- Edison invents electric light



A. Johnson
1865–1869

Grant
1869–1877

Hayes
1877–1881

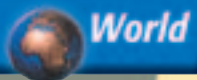
Garfield
1881

Arthur
1881–1885

1860

1870

1880



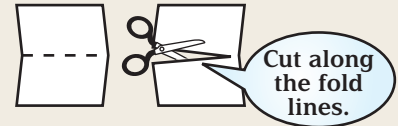
1867

- Canada becomes self-governing dominion



Identifying Main Ideas Study Foldable Make this foldable to describe the growth of industry in the United States in the late 1800s.

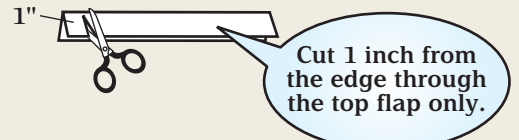
Step 1 Fold two sheets of paper in half from top to bottom. Cut the papers in half along the folds.



Step 2 Fold each of the four papers in half from top to bottom.



Step 3 On each folded paper, make a cut 1 inch from the side on the top flap.



Step 4 Place the folded papers one on top of the other. Staple the four sections together and label each of the tabs **Railroads**, **Inventions**, **Big Business**, and **Industrial Workers**.

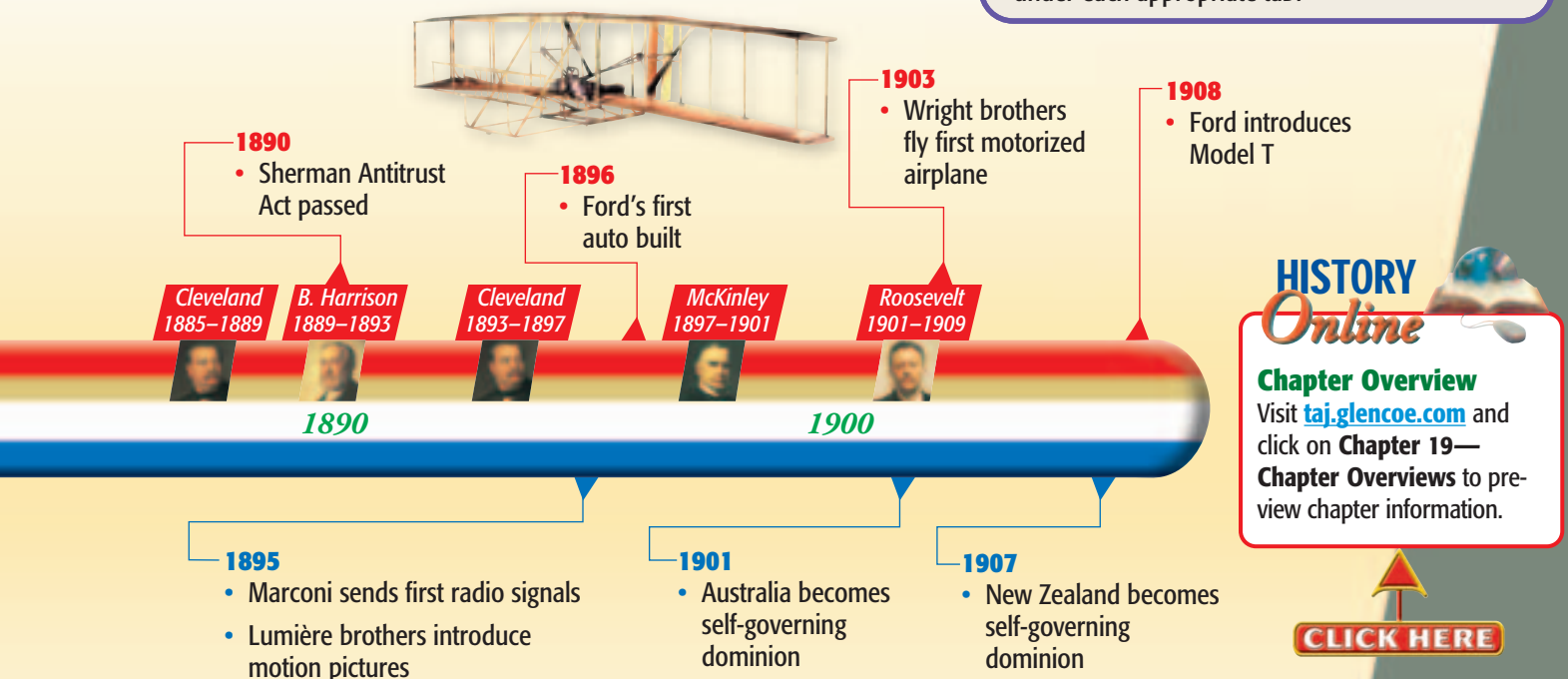
Staple here.



Reading and Writing As you read, write what you learn about the developments of industry under each appropriate tab.



The Ironworkers' Noontime by Thomas Pollock Anshutz Factory workers in Wheeling, West Virginia, take their noontime break.



HISTORY Online

Chapter Overview
Visit taj.glencoe.com and click on **Chapter 19—Chapter Overviews** to preview chapter information.



SECTION 1 Railroads Lead the Way

Guide to Reading

Main Idea

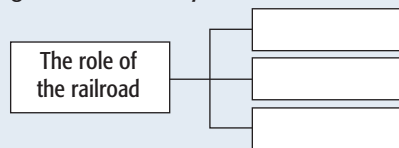
A growing transportation network spread people, products, and information across the nation.

Key Terms

consolidation, standard gauge, rebate, pool

Reading Strategy

Analyzing Information As you read the section, complete a diagram like the one shown by describing the contributions of the railroad to the growth of industry.



Read to Learn

- how the railroad barons made huge fortunes.
- how the national railroad system changed the American economy.

Section Theme

Geography and History As the railroads expanded, the centers of some industries shifted.

Preview of Events



Train song sheet

AN American Story

Rugged construction gangs labored on the Union Pacific and other railways during the transportation boom of the late 1800s. The chorus of a favorite song told of the hard work of the tarriers, or drillers:

And drill, ye tarriers, drill!

Drill, ye tarriers, drill!

*For it's work all day for sugar in
your tay,*

Down behind of the railway and,

Drill, ye tarriers, drill!

And blast!

And fire!

Railroad Expansion

During the Civil War, trains carried troops, weapons, and supplies to the front. The superior railroad system of the North played an important role in its victory over the South. In the decades after the war, railroads became a driving force behind America's economic growth. The first transcontinental railroad, completed in 1869, was soon followed by others. By the 1890s five railway lines crossed the country, and hundreds of smaller lines branched off from them. The



railroad system grew rapidly. In 1860 the United States had about 30,000 miles (48,270 km) of railroad track. By 1900, the nation had nearly 250,000 miles (402,250 km) of track.

Work songs such as “John Henry” and “I’ve Been Working on the Railroad” were popular among those who labored to build these miles of track. They sang:

“I’ve been working on the railroad,
All the live-long day,
I’ve been working on the railroad,
Just to pass the time away.”

The expansion of the railroad system was accompanied by **consolidation**—the practice of combining separate companies—in the industry. Large railroad companies expanded by buying smaller companies or by driving them out of business. Consolidation made the large companies more efficient. After consolidation, a few powerful individuals known as **railroad barons** controlled the nation’s rail traffic.

Railroad Barons

New Yorker Cornelius Vanderbilt, one of the first railroad barons, gained control of the New York Central line and then made a fortune by consolidating several companies. His railroad empire stretched from New York City to the Great Lakes.

Another railroad baron, James J. Hill, built the Great Northern line between Minnesota and Washington State. Until his death in 1916, Hill continued building and directing his ever-growing business empire. Collis P. Huntington, Leland Stanford, and two other partners founded the Central Pacific, which connected California and Utah.

The railroad barons were aggressive and competitive. They lived in an age when few laws had been passed to regulate business, and some of their methods were highly questionable. Nevertheless, the railroad barons played an important part in building the nation’s transportation system.

Reading Check Analyzing What did consolidation mean for many small companies?

Economics

Railroads Stimulate the Economy

The fast-growing national rail system created new economic links in the country. The railroads carried raw materials such as iron ore, coal, and timber to factories. They also carried manufactured goods from factories to markets and transported produce from farming areas to the cities.

The national railroad system encouraged the expanding economy in many other ways. At first the demand for iron tracks and locomotives helped the iron mining and processing industries grow. Around 1880 railroad companies began using tracks of steel—a metal made stronger by adding carbon and other elements to refined iron. The use of steel in railroad tracks stimulated America’s steel industry.

The railroads also helped other industries to thrive. The lumber industry, which supplied wood for railway ties, and the coal industry, which provided fuel for locomotives, saw extraordinary growth. In addition railroad companies provided work for thousands of people who laid tracks and built stations and for those who manufactured railway cars and equipment.

Improving the Railroads

Increased use made it necessary for railroads to expand and unify their systems. While railroads were being built across the country, different lines used rails of different gauges, or widths. As a result trains of one line could not use another line’s tracks. Many early local lines carried goods for short distances and did not even

Railroads employed more workers in the late 1800s than any other industry. In the late 1800s, railroads became the nation’s largest industry. It surpassed all others as a buyer of iron, steel, and coal, and became the nation’s largest employer.



Geography Skills

By the 1890s more than 150,000 miles (241,350 km) of tracks had been laid.

1. **Identifying** Which railroad connected Los Angeles to New Orleans?
2. **Analyzing Information** Which railroads would a traveler use from St. Louis to Virginia City?

connect with other lines. The gaps in service between the various lines made long-distance railroad travel slow and inefficient.

As the railroad companies consolidated, railroad barons saw the advantages of being part of a national railroad network. During the late 1880s, almost all companies adopted a **standard gauge** of 4 feet, 8.5 inches as the width of the railroad track. A standard gauge allowed faster shipment of goods at a reduced cost. It was no

longer necessary to load and unload goods from one train to another. One train could make the entire journey.

Railroad Technology

Railway transportation also improved with the introduction of new technology. Four developments were particularly important. Inventor **George Westinghouse** devised air brakes that improved the system for stopping trains, making train travel safer. Janney car couplers, named after inventor **Eli H. Janney**, made it easier for railroad workers to link cars. Refrigerated cars, developed by **Gustavus Swift**, enabled the railroads to ship meat and other perishable goods over long distances. Finally, **George M. Pullman** developed the Pullman sleeping car—



a luxury railway car with seats that converted into beds for overnight journeys. Pullman also introduced improved dining cars, raising train travel to a new level of comfort.

Competing for Customers

As the railroad network expanded, the railroad companies competed fiercely with one another to keep old customers and to win new ones. Large railroads offered secret discounts called **rebates** to their biggest customers. Smaller railroads that could not match these rebates were often forced out of business. Giving discounts to big customers raised freight rates for farmers and other customers who shipped small amounts of goods.

The railroad barons also made secret agreements among themselves, known as **pools**. They divided the railway business among their companies and set rates for a region. With no other competition in its region, a railroad could charge higher rates and earn greater profits. Although Congress and some states passed laws to regulate the railroads, these laws did little to curb the railroad barons.

Railroads Change America

The growing railroad network paved the way for American industry to expand into the West. The center of the flour milling industry, for

example, shifted westward in the 1800s, moving from the East Coast to Ohio, to Minneapolis, and finally to Kansas City. Other industries followed the same pattern. As farmers settled the Great Plains, the manufacturing center for agricultural equipment moved from central New York State to Illinois and Wisconsin.

Railroads also touched the lives of thousands of Americans. Trains redistributed the population. They carried homesteaders into the Great Plains and the West. Trains also made it easy for people to move from rural areas to the cities.

Time Zones

Railroads affected the way Americans thought about time as well. As train travel became more common, people began measuring distances by how many hours the trip would take rather than by the number of miles traveled. The spread of the railroad system led to a national system of time with four time zones.

The railroads opened the entire United States to settlement and economic growth and united the different regions of the country into a single network. At the same time, inventions that revolutionized transportation and communication brought Americans together in new ways.

Reading Check Explaining Why was adopting standard-gauge tracks important for the railroad industry?

SECTION 1 ASSESSMENT

Checking for Understanding

- Key Terms** Use each of these terms in a sentence that will help explain its meaning: **consolidation, standard gauge, rebate, pool.**
- Reviewing Facts** Describe the methods used by railroad barons to drive smaller companies out of business.

Reviewing Themes

- Geography and History** How did the railroads pave the way for the expansion of industry in the West?

Critical Thinking

- Making Inferences** Do you think the federal government should have intervened to regulate the unfair practices of the railroad barons? Why or why not?
- Organizing Information** Re-create the diagram below and identify the developments in technology that improved railroad transportation.



Analyzing Visuals

- Geography Skills** Study the map of the major western railroads that appears on page 558. Through what states did the Great Northern Railroad pass? Through what cities in Montana did railroads pass?

Interdisciplinary Activity

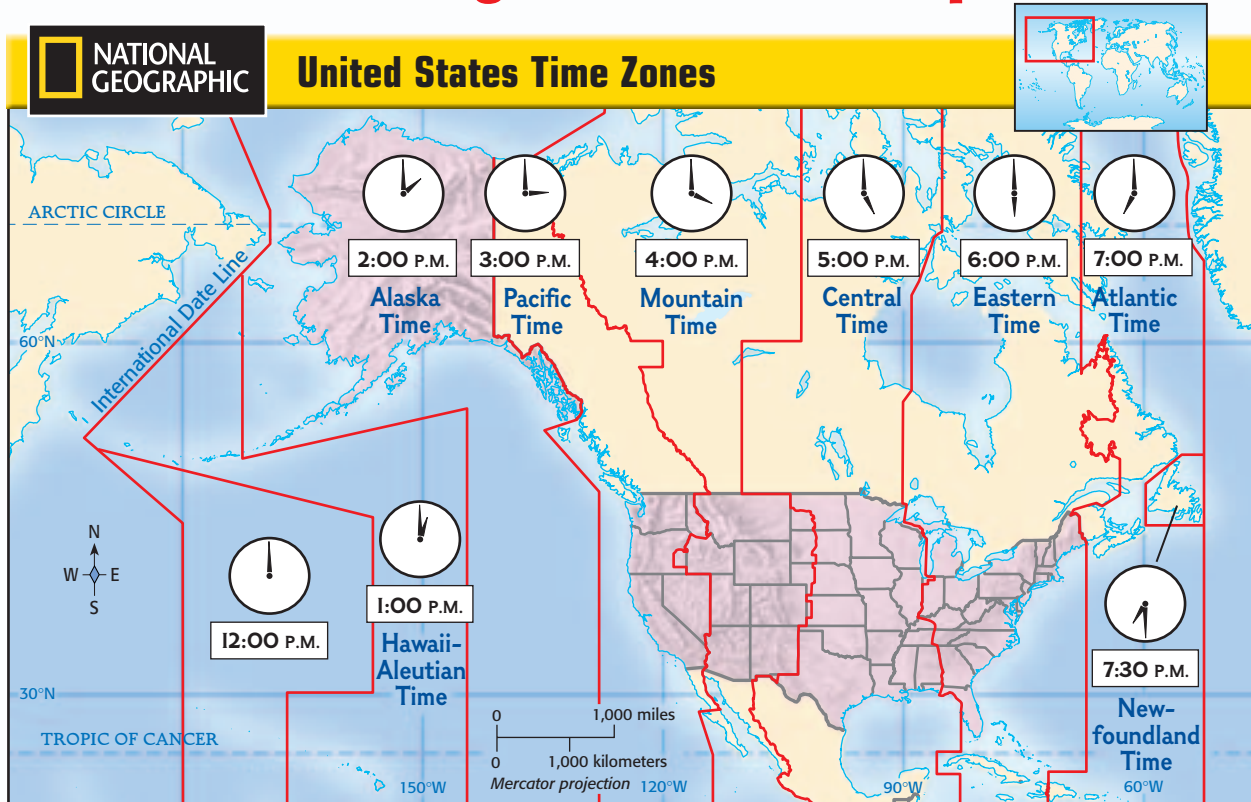
Art Create an ad with words and pictures to announce the development of the new Pullman sleeping car.





Social Studies SKILLBUILDER

Reading a Time Zone Map



Earth's surface is divided into 24 time zones. Each zone represents 15° longitude, or the distance the earth rotates in one hour. The 0° line of longitude—the Prime Meridian—is the starting point for figuring time around the world. Traveling west from the Prime Meridian, it becomes one hour earlier; traveling east, it becomes one hour later. To read a time zone map, follow these steps:

- Locate a place where you know what time it is and select another place where you wish to know the time.
- Notice the time zones you cross between these two places.
- If the second place lies east of the first, add an hour for each time zone. If it lies west, subtract an hour for each zone.

Practicing the Skill

- 1 Describe how U.S. time changes as you move from east to west.
- 2 What U.S. time zone lies farthest west?
- 3 If it is 6:00 P.M. in Washington, D.C., what time is it in San Diego, California?

Applying the Skill

Reading a Time Zone Map It takes two hours to fly from Denver, Colorado, to Chicago, Illinois. If you leave Denver at 2:00 A.M., what time will it be in Chicago when you arrive?



Glencoe's **Skillbuilder Interactive Workbook CD-ROM, Level 1**, provides instruction and practice in key social studies skills.

SECTION 2

Inventions

Guide to Reading

Main Idea

Inventions improved the transportation and communication networks that were vital to the nation's industrial growth.

Key Terms

assembly line, mass production

Reading Strategy

Organizing Information As you read the section, re-create the diagram below to list each person's invention and to explain the significance of each invention to industrial growth.

| | Invention | Significance |
|----------------|-----------|--------------|
| Samuel Morse | | |
| Alexander Bell | | |
| Thomas Edison | | |

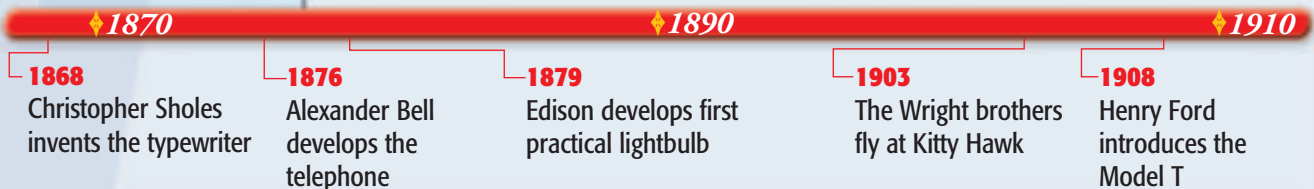
Read to Learn

- what changes in transportation and communication transformed America.
- how labor-saving inventions affected life.

Section Theme

Science and Technology New inventions promoted economic growth.

Preview of Events



Auto hood ornament

AN American Story

In the early 1900s, American songwriters were caught up in the public fascination with new inventions. One of the most popular songs of 1905, "In My Merry Oldsmobile," celebrated the automobile:

*"Come away with me Lucile,
In my merry Oldsmobile.
Down the road of life we'll fly,
Automobubbling you and I.*

*To the church we'll swiftly steal,
Then our wedding bells will peal;
You can go as far as you like, . . .
In my merry Oldsmobile."*

Communication Changes

By 1910 Americans in cities drove cars through streets lit with electric lights. They went to department stores where they bought everything from kitchen sinks to shoes. Americans could also do their shopping by mail—or pick up the telephone and order groceries from the local store. The automobile, the electric light, and the telephone were all invented after 1870. Within a generation they had become part of everyday life for millions of people. New inventions helped people communicate more quickly over long distances. Improvements in communication helped unify the regions of the country and promoted economic growth.



Why It Matters

The First Flight at Kitty Hawk

A small crowd of people assembled on the sand dunes at Kitty Hawk, North Carolina, to test the Wrights' Flyer. Covering a few hundred feet in 12 seconds, the flight came to a halt when the Flyer's wing caught on one of the dunes. It was enough to encourage the Wrights to try further flights. They would soon have a practical aircraft and the world would have a new form of transportation.



Space shuttle Discovery, 1990

The Beginning of Controlled, Powered Flight

Inventors experimented with engine-powered aircraft in the 1800s, but the age of air travel did not begin until 1903 at Kitty Hawk, North Carolina. Orville and Wilbur Wright, brothers and bicycle mechanics, built a wood-and-canvas plane with a 12-horsepower engine. On the morning of December 17, Orville Wright took off in their plane and flew a distance of 120 feet.

Firsts in Aviation History

In less than 100 years, aviators advanced from making the first flight in a glider to breaking the speed of sound.

1853 →
Human-carrying flight in a glider built by Sir George Cayley takes place

1874 →
Steam-powered monoplane is briefly airborne

1903 →
Wright brothers take flight at Kitty Hawk

1909 →
Louis Blériot flies across the English Channel

1914 →
Scheduled airline service opens between St. Petersburg and Tampa, Florida

The Telegraph

Samuel Morse had introduced the telegraph in 1844. By 1860 the United States had thousands of miles of telegraph lines, which were controlled for the most part by the Western Union Telegraph Company. At telegraph offices, trained operators transmitted messages in Morse code. Telegrams offered almost instant communication and had many uses. Shopkeepers relied on telegrams to order goods, and reporters used them to transmit stories to their newspapers. Americans also began sending personal messages by telegram.

The telegraph soon linked the United States and Europe. In the 1860s news from Europe traveled to this country by ship and took several

weeks. **Cyrus Field** wanted to speed up the process. After several unsuccessful attempts, in 1866 Field managed to lay a telegraph cable across the Atlantic Ocean. The new transatlantic telegraph carried messages in a matter of seconds, bringing the United States and Europe closer together.

The Telephone Rings In

Alexander Graham Bell invented a device that revolutionized communications even more than Morse's telegraph. Born and educated in Scotland, Bell moved to the United States, where he studied ways of teaching hearing-impaired people to speak. At the same time, he experimented with sending voices through electrical wires.





Bi-wing plane,
early 1900s



Taking to the Air

- The Flyer was a biplane with a light and powerful gas engine.
- The Wrights used adjustable rudders to control the aircraft as it turned.
- The two propellers were each 8½ feet in diameter.
- The wingspan reached 40 feet, 4 inches.
- The distance from the nose to the tail was 21 feet, 1 inch.
- The weight of the craft was 605 pounds.



Chuck Yeager and
the Bell X-1

1914 →
Aerial combat
between German
and French World
War I pilots

1919 →
First nonstop flight
across the Atlantic
Ocean

1927 →
Lindbergh com-
pletes first nonstop
solo transatlantic
flight

1939 →
German Heinkel is
first jet-powered
aircraft to fly

1947 →
Chuck Yeager is
first to fly faster
than the speed of
sound

By 1876 Bell developed a device that transmitted speech—the telephone. While Bell was preparing to test the device, he accidentally spilled some battery acid on his clothes. In panic Bell called out to his assistant in another room: “Mr. Watson, come here. I want you!” Watson heard Bell’s voice coming through the telephone. The invention was a success.

Bell formed the Bell Telephone Company in 1877. By the 1890s he had sold hundreds of thousands of phones. Most early telephone customers were businesses. Before long, though, telephones became common in homes.

Reading Check Explaining How did the telegraph affect communication?

The Genius of Invention

The late 1800s saw a burst of inventiveness in the United States. Between 1860 and 1890, the United States government granted more than 400,000 patents for new inventions.

Many of the inventions helped businesses operate more efficiently. Among these were Christopher Sholes’s typewriter (1868) and William Burroughs’s adding machine (1888).

Other inventions affected everyday life. In 1888 **George Eastman** invented a small box camera—the Kodak—that made it easier and less costly to take photographs. **John Thurman** developed a vacuum cleaner in 1899 that simplified housework.





Thomas Edison

The Wizard of Menlo Park

Thomas Edison was called “dull” by his teachers. Because of poor hearing he had trouble in school and often didn’t attend. His mother finally removed him from school and taught him at home. He loved anything related to science, and she allowed him to set up a chemistry lab in the family’s basement. When he was 12, he got a job working for the railroad, where he set up a new lab in an empty freight car. One day, Edison saved the life of a child who had fallen onto the tracks of an oncoming train. The child’s father took an interest in Edison and taught him to use the telegraph. Edison’s first invention was a gadget that sent automatic telegraph signals—which he invented so he could sleep on the job.

While still in his 20s, Edison decided to go into the “invention business.” In 1876 Edison set up a workshop in Menlo Park, New Jersey. Out of this famous laboratory came the phonograph, the motion picture projector, the telephone transmitter, and the storage battery. But Edison’s most important invention was the electric lightbulb.

Edison developed the first workable lightbulb in 1879. He then designed power plants that could produce electric power and distribute it to lightbulbs. For Christmas in 1880, Edison


used 40 bulbs to light up Menlo Park. Visitors flocked to see the “light of the future.” He built the first central electric power plant in 1882 in New York City—illuminating 85 buildings!

Inventor **George Westinghouse** took Thomas Edison’s work with electricity even further. In 1885 Westinghouse developed and built transformers that could send electric power more cheaply over longer distances. Soon electricity powered factories, trolleys, streetlights, and lamps all over America. Westinghouse also developed a system for transporting natural gas and invented many safety devices.

African American Inventors

A number of African Americans contributed to the era of invention. **Lewis Howard Latimer**, an engineer, developed an improved filament for the lightbulb and joined Thomas Edison’s company. **Granville Woods**, an electrical and mechanical engineer from Ohio, patented dozens of inventions. Among them were an electric incubator and railroad improvements such as an electromagnetic brake and an automatic circuit breaker. **Elijah McCoy** invented a mechanism for oiling machinery.

Jan E. Matzeliger, another African American inventor, developed a shoe-making machine that performed many steps previously done by hand. His device, which revolutionized the shoe industry, was adopted in shoe factories in the United States and overseas.

 **Reading Check** **Evaluating** Which of Edison’s inventions do you think is the most valuable to our world? Explain your reasoning.

A Changing Society

In the 1900s improvements ushered in a new era of transportation. After a period of experimentation, the automobile became a practical method of getting from place to place.

Henry Ford’s Automobiles

Henry Ford wanted to build an inexpensive car that would last a lifetime. While working as an engineer in **Detroit, Michigan**, in the 1890s, Ford had experimented with an automobile



engine powered by gasoline. In 1903 he established an automaking company and began designing cars.

In 1906 Ford had an idea for a new type of car. He told Charles Sorenson, later Ford's general superintendent, "We're going to get a car now that we can make in great volume and get the prices way down." For the next year, Ford and Sorenson worked on the **Model T**, building the car and testing it on rough roads. In 1908 Ford introduced the Model T to the public. Sorenson described the sturdy black vehicle as

“... a car which anyone could afford to buy, which anyone could drive anywhere, and which almost anyone could keep in repair.”

These qualities made the Model T immensely popular. During the next 18 years, Ford's company sold 15 million Model T's. Henry Ford also pioneered a new, less expensive way to manufacture cars—the **assembly line**. On the assembly line, each worker performed an assigned task again and again at a certain stage in the production of the automobile. The assembly line

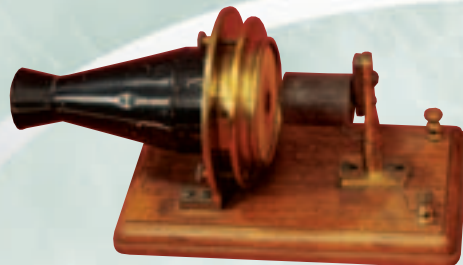
MORE ABOUT...

Changing the Way We Live

Inventions American ingenuity, innovation, and imagination led to the inventions that changed the way we live and how we communicate.



Lighting the World Lewis Latimer improved on Edison's version, creating a bulb that lasted much longer, and developed the threaded socket. Latimer directed the installation of electric street lights in New York City, Philadelphia, Montreal, and London.



The Telephone Alexander Graham Bell demonstrated the telephone in 1876. The telephone soon became a necessity. By 1900 there were 2 million in use.



Phonograph The first practical phonograph was built by Thomas Edison in 1877.



Kodak Camera In 1888 George Eastman invented a small camera that made it easier and less costly to take photographs.



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1912 Model T Ford

up to then, service was only to post offices. By the 1890s, the U.S. Post Office had expanded its delivery service in rural areas.

Merchants could now send goods across the country nearly as easily as across town. Some firms developed mail order businesses, receiving and shipping orders by mail. Companies such as Montgomery Ward and Sears Roebuck published catalogs that offered a wide range of goods from shoes to farm equipment. Catalogs introduced rural families to a wide assortment of goods not found in country stores.

Chain stores—stores with identical branches in many places—grew rapidly. F.W. Woolworth’s chain of “five-and-ten-cent stores” specialized in the sale of everyday household and personal items at bargain prices. By 1911 more than a thousand Woolworth’s were in operation. The Woolworth Building, erected in New York City in 1913, stood 792 feet (241 meters) tall—the tallest building in the world at that time.

revolutionized industry, enabling manufacturers to produce large quantities of goods more quickly. This **mass production** of goods decreased manufacturing costs, so products could be sold more cheaply.

Selling Goods

With factories churning out more and more products, merchants looked for better ways to sell their goods. One way was through the mail. In 1863 mail delivery to homes began—

✓ Reading Check **Describing** What qualities made the Model T popular?

SECTION 2 ASSESSMENT

Checking for Understanding

- Key Terms** Use the terms **assembly line** and **mass production** in a complete sentence that explains their meaning.
- Reviewing Facts** Name and describe two inventions that changed the way Americans communicated in the 1800s.

Reviewing Themes

- Science and Technology** How was transportation improved during the early 1900s?

Critical Thinking

- Drawing Conclusions** Which invention do you think brought about the most dramatic change in people’s lives? Explain.
- Organizing Information** Re-create the diagram below. From the description of inventions in this section, classify each invention in one of the categories.

| Mostly rural use | Mostly urban use | Both urban and rural | Mostly used by business and industry |
|------------------|------------------|----------------------|--------------------------------------|
| | | | |

Analyzing Visuals

- Artifacts** Study the photographs of the inventions and products that appear in Section 2. Which have undergone the greatest change? Why do you think this is so?

Interdisciplinary Activity

Science Write a one-page paper describing how the inventions mentioned in this section changed the way Americans viewed the world. Discuss how these inventions led to further advances in scientific theory.



SECTION 3

An Age of Big Business

Guide to Reading

Main Idea

Business growth was driven by the formation of corporations and the ambition of their owners.

Key Terms

corporation, stock, shareholder, dividend, horizontal integration, trust, monopoly, vertical integration, philanthropy, merger

Reading Strategy

Analyzing Information As you read the section, re-create the diagram below and explain the significance of each term to business in the late 1800s.

| | Significance |
|-----------------|--------------|
| Shareholders | |
| Stock exchanges | |
| Mergers | |

Read to Learn

- how new discoveries and inventions helped industries grow.
- why the development of large corporations brought both benefits and problems.

Section Theme

Economic Factors Corporations changed the American economy of the late 1800s.

Preview of Events



John D. Rockefeller

AN American Story

John D. Rockefeller, a young oil man, never tired until he got what he wanted. One person commented: "The only time I ever saw John Rockefeller enthusiastic was when a report came in . . . that his buyer had secured a cargo of oil at a figure much below the market price. He bounded from his chair with a shout of joy, danced up and down, hugged me, threw up his hat, acted so like a madman that I have never forgotten it. . . ."

Foundations for Growth

In the hills of western Pennsylvania, a sticky black substance—petroleum—seeped from the ground. For a while promoters sold the oil as medicine. Then in the 1850s researchers found they could burn petroleum to produce heat and smoke-free light. It could also be used to lubricate machinery. Suddenly oil became valuable. A former railroad conductor named Edwin L. Drake believed that he could find petroleum by digging a well. People thought Drake was wrong. Few people knew that pools of oil did indeed exist underground.



In 1859 Drake decided to test his belief. He drilled a well in **Titusville, Pennsylvania**, and struck oil. This led to the creation of a multimillion-dollar petroleum industry.

Factors of Production

The period from the end of the Civil War to 1900 was an era of unmatched economic growth in the United States. New methods in technology and business allowed the country to tap its rich supply of natural resources, increase its production, and raise the money needed for growth. The growing transportation system made it easier for merchants to reach distant markets.

The change from an agricultural economy to an industrial one was possible because the United States had the resources needed for a growing economy. Among these resources were what economists call the **factors of production**: land, labor, and capital.

The first factor of production, **land**, means not just the land itself but all natural resources. The United States held a variety of natural resources that were useful for industrial production.

The second production factor is **labor**. Large numbers of workers were needed to turn raw materials into goods. This need was met by the rapid growth of population. Between 1860 and 1900, the population of the country more than doubled.

The third production factor, **capital**, is the equipment—buildings, machinery, and tools—used in production. Land and labor are needed to produce capital goods. These goods, in turn, are essential for the production of consumer goods.

The term “capital” is also used to mean money for investment. Huge amounts of money were needed to finance industrial growth. One source of money was the selling of stock by corporations. Another was corporate savings, or businesses investing a portion of their earnings in better equipment.

Raising Capital

With the economy growing after the Civil War, many railroads and other businesses looked for ways to expand. To do so they had to raise capital. They needed capital to buy raw materials and equipment, to pay workers, and to cover shipping and advertising costs.

One way a company could raise capital was by becoming a **corporation**. A corporation is a company that sells shares, or **stock**, of its business to the public. The people who invest in the corporation by buying stock are its **shareholders**, or partial owners.

In good times shareholders earn **dividends**—cash payments from the corporation’s profits—on the stock they own. If the company prospers, its stock rises in value, and the shareholders can sell it for a profit. If the company fails, however, the shareholders lose their investment. In the late 1800s hundreds of thousands of people shared in corporate profits by buying and selling stocks in special markets known as **stock exchanges**.

Growth of Corporations

Railroads were the first businesses to form corporations, or “incorporate.” Soon manufacturing firms and other businesses were incorporating as well. The growth of corporations helped fuel America’s industrial expansion in the years following the Civil War.

Banks played a major role in this period of economic growth. Businesses borrowed money from banks to start or expand their operations. The banks, in turn, made profits on the loans.

✓ Reading Check

Explaining What are dividends?



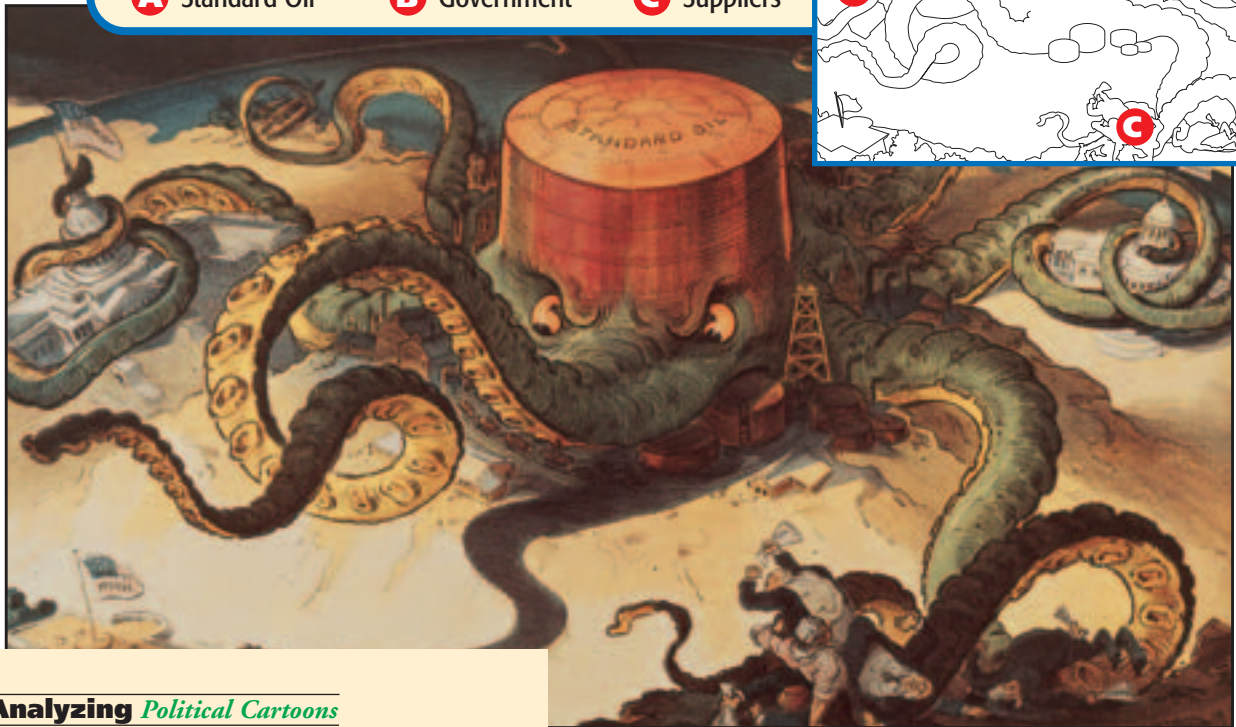
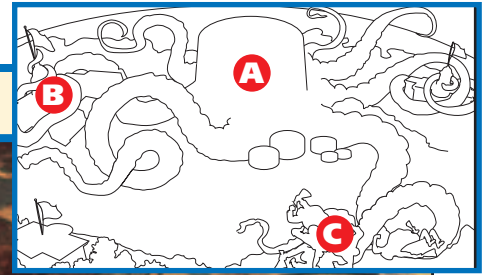
Sign advertising oil



A Standard Oil

B Government

C Suppliers



Analyzing *Political Cartoons*

Standard Oil was often portrayed as a “monopoly monster,” with its arms reaching out to control government and suppliers. **Why do you think the cartoonist chose an octopus to represent Standard Oil?**

The Oil Business

The oil industry grew rapidly in the late 1800s. Edwin Drake’s Titusville well produced 15 barrels of petroleum a day. As word of his success spread, prospectors and investors hurried to western Pennsylvania. “Oil rush” towns with names such as Oil City and Petroleum Center sprang up overnight. The oil boom expanded as prospectors struck oil in Ohio and West Virginia.

John D. Rockefeller

Born in Richford, New York, in 1839, **John D. Rockefeller** made his fortune from oil. When Rockefeller was 26 years old, he and four partners set up an oil refinery—a plant to process oil—in **Cleveland, Ohio**.

In 1870 Rockefeller organized the Standard Oil Company of Ohio and set out to dominate the oil industry. He acquired most of the oil refineries in Cleveland and other cities.

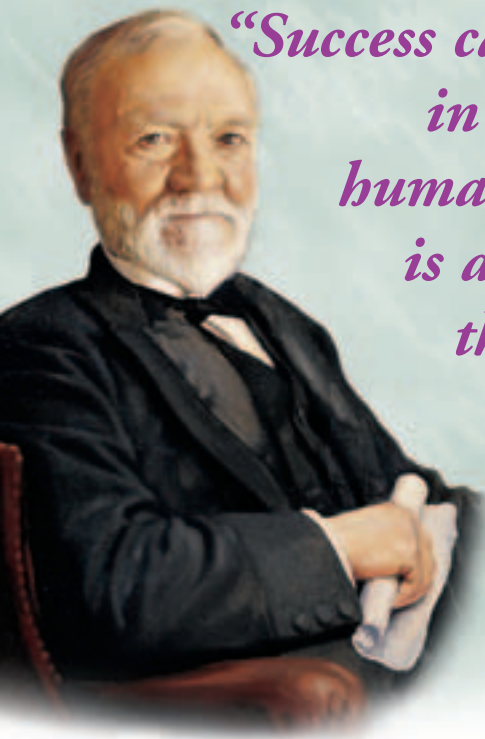
One method Rockefeller used to build his empire was **horizontal integration**—combining competing firms into one corporation. The corporation produced and used its own tank cars, pipelines, and even its own wooden barrels—made from forests owned by Standard Oil. Standard Oil grew in wealth and power, becoming the most famous corporate empire of the day.

The Standard Oil Trust

To strengthen Standard Oil’s position in the oil industry, Rockefeller lowered his prices to drive his competitors out of business. In addition he pressured customers not to deal with rival oil companies, and he persuaded the railroads to grant him rebates in exchange for his business.

Rockefeller increased his control of the oil industry in 1882 by forming a **trust**, a group of companies managed by the same board of directors. First he acquired stock in many different oil companies. Then the shareholders of these companies traded their stock for Standard Oil stock, which paid higher dividends. This gave Standard Oil’s board of directors ownership of the





*“Success can be attained
in any branch of
human labor. There
is always room at
the top in every
pursuit.”*

—Andrew Carnegie, 1903

other companies’ stock and the right to manage those companies. Rockefeller had created a **monopoly**—almost total control by a single producer—of the oil industry.

 **Reading Check Explaining** What method did Rockefeller use to build his oil empire?

The Steel Business

Steel also became a huge business in the late 1800s. Steel is a strong and long-lasting form of iron treated with carbon—the ideal material for railroad tracks, bridges, and many other products. Before the 1860s, however, steel was not widely used because it was expensive to manufacture. The development of new manufacturing techniques helped to overcome this problem.

Steel Industry Growth

Two new methods of making steel—the Bessemer process, developed by Henry Bessemer of England, and the open-hearth process—changed the industry. With the new methods, mills could produce steel at affordable prices and in large quantities. In the 1870s large steel mills emerged close to sources of iron ore in western Pennsylvania and eastern Ohio.

Pittsburgh, Pennsylvania, became the steel capital of the United States. Cities located near the mines and close to waterways like Cleveland, Chicago, Detroit, and Birmingham, Alabama, also became centers of steel production.

Andrew Carnegie

The leading figure in the early years of the American steel industry was **Andrew Carnegie**, son of a Scottish immigrant. Starting as a telegraph operator, Carnegie worked his way up to become manager of the Pennsylvania Railroad. In 1865 he left that job to invest in the growing iron industry.

Carnegie soon realized that steel would have an enormous market. After learning about the Bessemer process, he built a steel plant near Pittsburgh that used the new process. Carnegie named

the plant the J. Edgar Thompson Steel Works, after the president of the Pennsylvania Railroad—his biggest customer.

Vertical Integration

By 1890 Andrew Carnegie dominated the steel industry. His company became powerful through **vertical integration**, acquiring companies that provided the equipment and services he needed. Carnegie bought iron and coal mines, warehouses, ore ships, and railroads to gain control of all parts of the business of making and selling steel. When Carnegie combined all his holdings into the Carnegie Steel Company in 1900, he was producing one-third of the nation’s steel.

In 1901 Carnegie sold his steel company to banker **J. Pierpont Morgan**. Morgan combined the Carnegie company with other businesses to form the United States Steel Corporation, the world’s first billion-dollar corporation.

Philanthropists

Andrew Carnegie, John D. Rockefeller, and other industrial millionaires of the time grew interested in **philanthropy**—the use of money to benefit the community. The philanthropists founded schools, universities, and other civic institutions across the United States.



Carnegie donated \$350 million to various organizations. He built Carnegie Hall in New York City, one of the world's most famous concert halls; the Carnegie Foundation for the Advancement of Teaching; and more than 2,000 libraries worldwide. Rockefeller used his fortune to establish the University of Chicago in 1890 and New York's Rockefeller Institute for Medical Research.

Corporations Grow Larger

In 1889 New Jersey encouraged the trend toward business monopolies by allowing holding companies to obtain charters, a practice that some states prohibited. A holding company would buy controlling interests in the stock of other companies instead of purchasing the companies outright. Rockefeller formed Standard Oil of New Jersey so that the corporation could expand its holdings. Other states also passed laws that made corporate **mergers**—the combining of companies—easier.

Mergers concentrated economic power in a few giant corporations and a few powerful individuals, such as Rockefeller and banker J. Pierpont Morgan. By 1900 one-third of all American manufacturing was controlled by just 1 percent of the country's corporations. These giant corporations were the driving force behind the

great economic growth of the period, but they also posed problems. On the one hand, many Americans admired the efficiencies that large businesses provided. On the other hand, some argued that a lack of competition hurt consumers. Without competition, corporations had no reason to keep their prices low or to improve their goods and services.

Government Regulation

State governments responded to the growing opposition to trusts and monopolies. During the 1880s, several states passed laws restricting business combinations. Corporations, however, avoided these laws by doing business in states that had no such laws.

Public pressure for a federal law to prohibit trusts and monopolies led Congress to pass the **Sherman Antitrust Act** in 1890. The law sought "to protect trade and commerce against unlawful restraint and monopoly." The act did not clearly define either "trusts" or "monopolies," however.

In its early years, the Sherman Antitrust Act did little to curb the power of big business. By contrast, in the 1890s the government did use the act to stop a strike by railroad workers that threatened to "restrain" the nation's mail delivery.

Reading Check **Comparing** How does vertical integration differ from horizontal integration?

SECTION 3 ASSESSMENT

Checking for Understanding

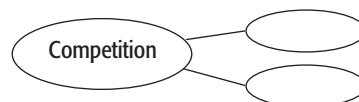
- Key Terms** Use the key terms that follow to write a newspaper article about Andrew Carnegie: **corporation, monopoly, vertical integration, philanthropy.**
- Reviewing Facts** What cities became centers of steel production in the late 1800s?

Reviewing Themes

- Economic Factors** Summarize the steps that John D. Rockefeller took to gain control of the oil industry.

Critical Thinking

- Determining Cause and Effect** Re-create the diagram below and list the benefits of competition to consumers.



- Comparing** Compare the methods used by Rockefeller and Carnegie to build their industrial empires. Describe any differences between the two.

Analyzing Visuals

- Analyzing Political Cartoons** Study the cartoon on page 569. Whom do the figures represent? What is the cartoon saying about the Standard Oil Company?

Interdisciplinary Activity

Citizenship Research to find a philanthropist who has provided benefits to the community in which you live—in the past or present. Share your findings with the class.

SECTION 4 Industrial Workers

Guide to Reading

Main Idea

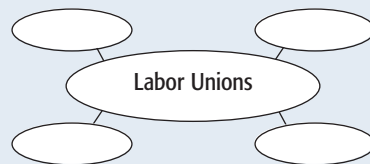
Workers organized to demand better pay and working conditions.

Key Terms

sweatshop, trade union, collective bargaining, strikebreaker, injunction

Reading Strategy

Organizing Information As you read the section, re-create the diagram below and list actions labor unions took to improve working conditions.



Read to Learn

- why workers demanded changes in their working conditions and wages.
- how labor unions helped workers gain economic and political power.

Section Theme

Groups and Institutions Industrial workers labored long hours for low pay.

Preview of Events

◆ 1870

1869

Knights of Labor organized

◆ 1880

1877

Railroad workers on strike

◆ 1890

1886

Riots erupt in Haymarket Square



Haymarket Riot news report

AN American Story

On a spring day in 1886, about 12,000 workers in Chicago's Haymarket Square manufacturing district were on strike. Nearly all were immigrants, and many wore small red ribbons on their jackets. At 2 o'clock a man climbed up on an empty freight car near the crowd. He moved to the edge of the roof and waved frantically at the crowd below. "Stand firm," he yelled. "Let every man stand shoulder to shoulder and we will win this fight. We must have our rights. Strike while the iron is hot. . . ."

Working Conditions

The industrial growth of the late 1800s created new jobs. Growth also raised the standard of living for many American workers. That is, necessities and luxuries were more available and affordable. Yet workers paid a price for economic progress. Factories had once been small workplaces where employers and employees knew one another and often worked side by side. As mass production spread, however, factories became larger and less personal.



Industrial laborers worked for 10 or 12 hours a day, six days a week. They could be fired at any time for any reason. Many lost their jobs during business downturns or were replaced by immigrants who were willing to work for lower pay.

Factories and mines were noisy, unhealthy, and unsafe. Accidents were common. Steel workers suffered burns from spills of hot steel. Coal miners died in cave-ins and from the effects of gas and coal dust. Textile workers' lungs were damaged by airborne lint. Garment workers toiled in crowded urban factories called **sweatshops**, where their eyesight was ruined by sewing for hours in poor light. Filled with flammable materials, the sweatshops were also terrible firetraps.

 (See page 971 for a first-person account of sweatshop conditions.)

Women Workers

Although the majority of working women in the late 1800s had jobs as domestic servants, women also joined the industrial workforce, especially the textile industry. By 1900 more than one million women worked in industry. However, because no laws regulated workers' salaries, women generally received about half of what men earned for the same work.

Child Labor

Industries also hired children. In 1900, hundreds of thousands of children under 16 years of age worked in factories. Concerned groups brought child labor to the attention of their state legislatures. As a result many states passed child-labor laws. These laws stated that children working in factories had to be at least 12 years old and should not work more than 10 hours a day. Employers widely ignored child-labor laws, however. Also, the laws did not apply to agriculture, which employed about one million children.

 **Reading Check** **Examining** How did mass production change the size of factories?

Labor Unions Form

Dissatisfied workers organized into groups—labor unions—to demand better pay and working conditions from their employers. Earlier in the 1800s, skilled workers had formed unions to

represent workers in certain crafts or trades, such as carpentry. These **trade unions** had little influence because each represented only one trade. By the mid-1800s labor leaders looked to expand their unions.

In 1869 garment cutters in Philadelphia founded the Noble and Holy Order of the **Knights of Labor**. Employers fired workers who joined labor organizations, so the Knights met secretly and used special handshakes to identify each other. Under the leadership of **Terence V. Powderly**, the Knights of Labor became a national labor organization in the 1880s. Unlike most unions, the Knights recruited people who had been kept out of trade unions, including women, African Americans, immigrants, and unskilled laborers.

The Knights of Labor grew rapidly to more than 700,000 members by 1886. However, a wave of strikes turned public opinion against the union, and it lost members and power in the 1890s.

In 1881 a group of national trade unions formed a federation that five years later became known as the **American Federation of Labor (AFL)**. The AFL represented skilled workers in various crafts.

Young coal miners in Kingston, Pennsylvania, c. 1900





Labor Unrest

- 1 1877 Great Railway Strike
Workers protest pay cuts
- 2 1886 Haymarket Affair
Labor rally ends in violence
- 3 1892 New Orleans
Workers from 42 unions demand shorter hours and better pay
- 4 1892 Homestead Strike
Steelworkers protest wage cut
- 5 1892 Silver Mines Unrest
State jails hundreds of striking workers
- 6 1894 Pullman Strike
Federal troops quell riots
- 7 1902 Anthracite Coal Strike
Miners strike to win union recognition
- 8 1914 Ludlow Massacre
State militia burns striking miners' tent colony



Geography Skills

The strike was the major weapon for workers against the management for whom they worked.

- 1. **Location** Which strikes involved miners?
- 2. **Analyzing Information** Which strike occurred in Martinsburg?

The AFL was led by **Samuel Gompers**, the tough, practical-minded president of the Cigar Makers' Union. The organization pressed for higher wages, shorter hours, better working conditions, and the right to bargain collectively with employers. In **collective bargaining**, unions represent workers in bargaining with management.

Although violent strikes turned public feeling against workers and unions in the late 1880s, the AFL survived and grew. By 1904 the AFL claimed more than 1.6 million members.

Women and the Unions

Many unions would not admit women workers, so some women formed their own unions. **Mary Harris Jones**, better known as Mother Jones, spent 50 years fighting for workers' rights.

In 1911 a fire broke out at the **Triangle Shirtwaist Company** factory, a crowded sweatshop in New York City. The workers, mostly young immigrant women, could not escape from the building because the company had locked the doors to prevent employees from leaving early. Nearly 150 workers died in the fire. The disaster led the **International Ladies' Garment Workers Union (ILGWU)** to push for a safer working environment.

Reading Check Comparing Who was eligible for membership in the AFL? In the Knights of Labor?





The Unions Act

Economic depressions in the 1870s and the 1890s led companies to fire workers and lower wages. Unions responded with large strikes that sometimes sparked violence.

Economic depression hit the nation following a financial panic in 1873. To cut costs, companies forced their workers to take pay cuts. In July 1877 angry strikers burned rail yards, ripped up track, and destroyed railroad property. The companies hired **strikebreakers** to replace the striking workers, and federal troops restored order.

Antilabor feeling grew stronger after a bloody clash between police and strikers in Chicago's Haymarket Square in May 1886. Striking workers from the McCormick Harvester Company gathered to protest the killings of four strikers the previous day. When police ordered the crowd to break up, an unidentified person threw a bomb that killed a police officer. Several more were killed in a riot that followed. Following the **Haymarket Riot**, many Americans associated the labor movement with terrorism and disorder.

In 1892 workers went on strike at Andrew Carnegie's steel plant in Homestead, Pennsylvania. Plant managers had cut workers' wages, hoping to weaken the steelworkers' union. When the union called a strike, Homestead managers hired nonunion workers and brought

in 300 armed guards to protect them. A fierce battle left at least 10 people dead. Pennsylvania's governor sent the state's militia to Homestead to restore order. The plant reopened with nonunion workers, protected by the troops. After the failure of the **Homestead Strike**, the steelworkers' union dwindled.

The employees of George Pullman's railway-car plant near Chicago went on strike in May 1894, when the company cut wages. Pullman responded by closing the plant. One month later, workers in the American Railway Union supported the strikers by refusing to handle Pullman cars, paralyzing rail traffic.

Pullman and the railroad owners fought back. They persuaded U.S. Attorney General Richard Olney to obtain an **injunction**, or court order, to stop the union from "obstructing the railways and holding up the mails." The workers and their leader, **Eugene V. Debs**, refused to end the strike. Debs was sent to jail.

President **Grover Cleveland** sent federal troops to Chicago, and soon the strike was over. The failure of the **Pullman Strike** dealt another blow to the union movement. Despite these setbacks, workers continued to organize to work for better wages and working conditions.

Reading Check **Describing** Why did the Pullman workers go on strike?

SECTION 4 ASSESSMENT

Checking for Understanding

- Key Terms** Write a paragraph about the American Federation of Labor. Use the following terms: **sweatshop**, **trade union**, **collective bargaining**, **strikebreaker**, **injunction**.
- Reviewing Facts** What role did Samuel Gompers play in union growth?

Reviewing Themes

- Groups and Institutions** What were the goals of the American Federation of Labor when it was founded?

Critical Thinking

- Drawing Conclusions** Why do you think many Americans did not immediately support the labor unions?
- Organizing Information** Re-create the diagram below and describe the roles each played in labor-management issues.

| Individual | Role |
|-------------------|------|
| Terence Powderly | |
| Mary Harris Jones | |
| George Pullman | |
| Grover Cleveland | |

Analyzing Visuals

- Geography Skills** Study the map on page 574. Which of the incidents shown on the map occurred in the 1890s? What events took place in Illinois? When did they occur?

Interdisciplinary Activity

Art Design a board game in which players can experience the ups and downs of factory work in the late 1800s. Include spaces such as "Workday extended to 12 hours. Miss a turn." and "Your union wins a pay hike. Collect \$5."



Chapter Summary

The Growth of Industry

Railroads

- Settlers are transported west.
- Railroads deliver raw materials and finished goods.
- Thousands of jobs are provided.
- Large railroads offer secret rebates to customers and make secret agreements that raise rates.

Inventions

- The telegraph links the United States and Europe.
- Alexander Graham Bell invents the telephone.
- Thomas Alva Edison invents the electric lightbulb.
- Henry Ford uses assembly lines to mass-produce the automobile.
- Wright brothers fly airplane at Kitty Hawk.
- New processes improve steel production.

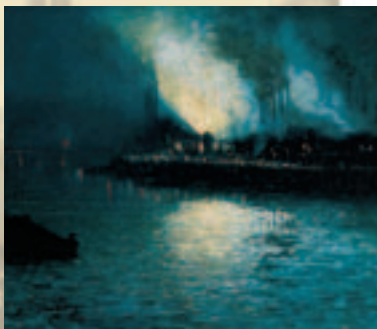


Companies

- Railroads are the first businesses to incorporate.
- John D. Rockefeller organizes Standard Oil, forms a trust, and creates a monopoly.
- Andrew Carnegie forms Carnegie Steel Company.
- Congress passes the Sherman Antitrust Act.

Labor Movement

- Working conditions in factories and mines are unhealthy.
- Women workers paid half of men's wages for same work.
- Child workers are exploited.
- Labor unions form to improve wages and working conditions.
- Labor union strikes sometimes result in violence.



Reviewing Key Terms

Use each of the following terms in a statement that might have been made by the person indicated.

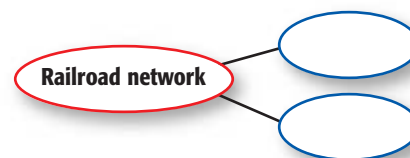
1. **Railroad owner:** rebate, pool, standard gauge
2. **Union member:** trade union, collective bargaining
3. **Factory owner:** mass production, assembly line
4. **Shareholder:** stock, dividend

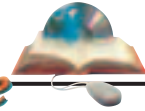
Reviewing Key Facts

5. What improvements in railway transportation were brought about by new technology?
6. What were four of Thomas Edison's inventions?
7. What inventions improved communications in the late 1800s?
8. What manufacturing methods did Henry Ford use to make his new automobile affordable?
9. What is vertical integration?
10. What action did Congress take to control trusts and monopolies in response to pressure from the American people?
11. What is collective bargaining?
12. How did the Haymarket Riot of 1886 affect public opinion about the labor movement?

Critical Thinking

13. **Analyzing Information** Describe the contributions of African American inventors in the late 1800s.
14. **Analyzing Themes: Economic Factors** How did horizontal integration differ from vertical integration?
15. **Drawing Conclusions** Why did workers think that forming organized labor unions would help them get what they wanted from employers?
16. **Analyzing Themes: Geography and History** Re-create the diagram below and describe two ways in which the growing railroad network helped American industry.





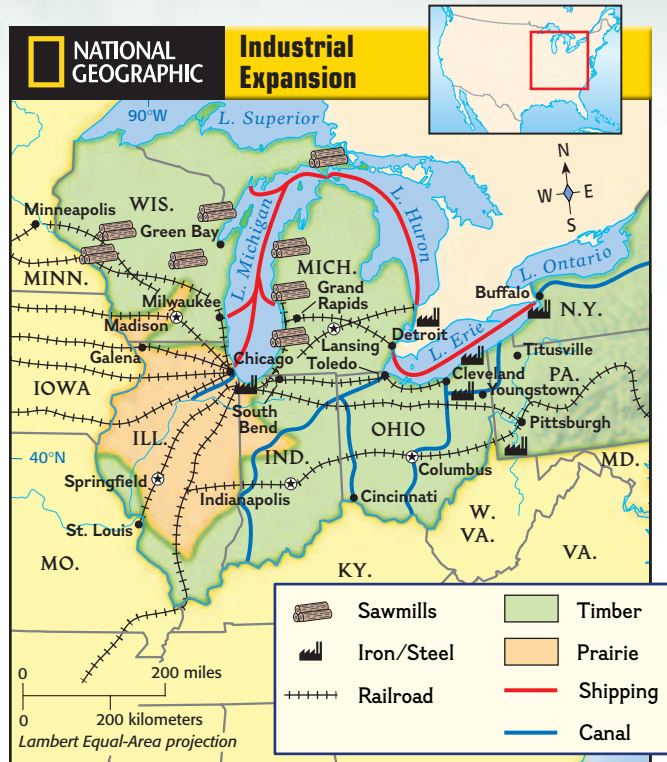
Self-Check Quiz

Visit taj.glencoe.com and click on **Chapter 19—Self-Check Quizzes** to prepare for the chapter test.



Geography and History Activity

Study the map below and answer the questions that follow.



17. **Movement** What forms of transportation moved goods into and out of this region?
18. **Human/Environment Interaction** What industry grew in the timbered regions of Wisconsin and Michigan?
19. **Location** Identify the major iron/steel manufacturing centers shown on the map.

Practicing Skills

Reading a Time Zone Map Study the time zone map on page 560. Use the map to answer the following questions.

20. If you traveled from Florida to California, what time zones would you cross?
21. If it is 6:00 a.m. in Maine, what time is it in Hawaii?
22. If it is 3:00 p.m. in Texas, what time is it in Alaska?

Citizenship Cooperative Activity

23. **Labor Unions** With another student, write a short essay in which you support or criticize labor unions from the point of view of a young person who has just entered the workforce. Note how you think a union could or could not improve your life. Share your essay with the class.

Economics Activity

24. Using a product that is familiar to you, explain how each of the factors of production was used in its creation.



Technology Activity

25. **Using a Spreadsheet** Become an imaginary shareholder in a corporation. Search for stock market data in a daily newspaper. Choose one stock to follow for a two-week period. Track the performance of the stock on a spreadsheet by marking its daily increases and decreases. Compare your spreadsheet with classmates' results and decide if you made a good investment.



Alternative Assessment

26. **Portfolio Writing Activity** Review the chapter for information about the four major union strikes between 1877 and 1894. Write a headline for each that might have appeared in newspapers following the strike.

Standardized Test Practice

Directions: Choose the *best* answer to the following question.

The development of the transformers that Westinghouse built led to an increase in

- F the price of electricity.
- G the use of gas to heat homes.
- H the use of electricity to power factories.
- J imported goods.

Test-Taking Tip

The phrase *led to* indicates that this question is looking for a *cause-and-effect* relationship. Remember that a *cause* is any person, event, or condition that makes something happen. What happens as a result is known as an *effect*.

Building a Conductivity Tester

What role does electricity play in your life? Can you imagine your life without electricity? Electricity powers lights, TVs, radios, ovens, microwaves, and computers, along with countless other objects you use every day.

The Way It Was

The Civil War had ended. No longer divided by war, Americans set about improving their lives. Inventors led the way. Inventors such as George Westinghouse, Lewis Howard Latimer, and Thomas Edison learned from one another, and together pushed the United States to become an industrial nation. To create the lightbulb, Edison first had to understand how electricity works. Now, conduct your own investigation of electrical currents, much as Edison did, and experience the life of an inventor. Find out which common objects are conductors and which are insulators by building and testing a battery-powered conductivity tester.

Believe It or Not

Thomas Edison suffered from hearing problems throughout his life. Although an operation could have saved his hearing, Edison refused it. He claimed he preferred deafness because it helped him concentrate.



Materials

- ✓ flashlight with one fresh D cell (battery)
- ✓ 3 pieces of insulated wire (each about 6 inches (15 cm) long, with the ends stripped)
- ✓ roll of masking or duct tape
- ✓ a penny
- ✓ a plastic comb
- ✓ several pieces of fabric
- ✓ a metal fork or spoon
- ✓ several different rocks
- ✓ various other objects to test

What To Do

Build your conductivity tester by unscrewing the top of the flashlight. You will find that the flashlight contains a bulb assembly.

- 1 Take one wire and tape it to the metal tip of the flashlight lightbulb. Tape a second wire to the metal ring that touches the side of the bulb.



- 2 Tape the other end of the wire that is connected to the tip of the lightbulb to the positive (+) end of a D cell (battery) and touch the free end of the second wire to the negative (-) end of the cell. The light should go on because you have made an electrical current. (If the light does not go on, make sure all the connections are taped tightly and make good contact.)



- 3 Tape one end of a third wire to the negative (-) end of the cell and touch the free end of that wire to the wire coming from the bulb holder. Again, the light should go on. Try touching the two free ends of the wires to the penny at the same time. The bulb should light because the penny is a good conductor.

Test your other objects in the same way that you tested the penny. Record whether they are conductors or insulators.

Project Report

1. In general, what types of materials make the best conductors?
2. From your experiment, how would you define an electrical current?
3. **Drawing Conclusions** What are some of the risks inventors take when experimenting with unfamiliar materials?

Go a Step Further



How was Edison able to invent such useful things? How would you go about inventing something? Research and learn about some of the inventors from the late 1800s and early 1900s. Note how these inventors got started. Then create a diagram that explains how you would go about creating a new invention.

