

The Industrial Age

Lesson 1 Railroads Lead the Way

ESSENTIAL QUESTION

How does technology change the way people live and work?

GUIDING QUESTIONS

1. *How did railroads pave the way for growth and expansion?*
2. *What industries benefited from the expansion of the railroad system?*

Terms to Know

consolidation combining companies

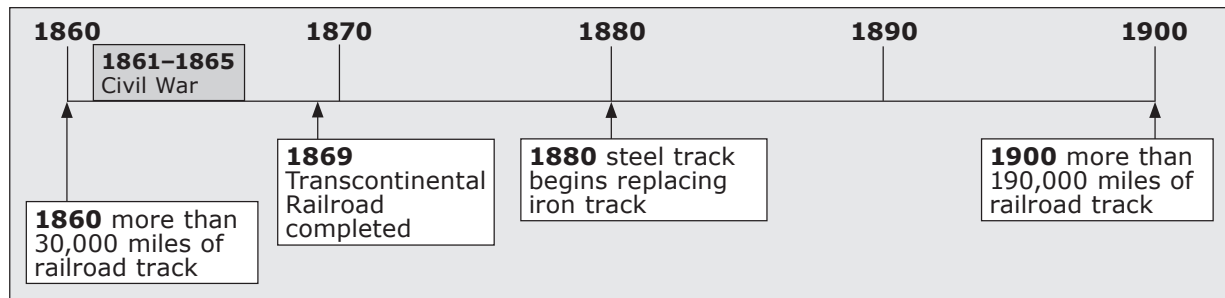
railroad baron powerful businessman who ran a large railroad

standard gauge the distance between the rails used by all American railroads

rebate discount

pool a group of businessmen who made secret agreements about prices and customers

When did it happen?



What do you know?

In the first column, answer the questions based on what you know before you study. After this lesson, complete the last column.

Now...		Later...
	What industries benefited from railroads?	
	How did railroad companies expand?	

The Industrial Age

Lesson 1 Railroads Lead the Way, *Continued*

The Growth of Railroads

Many railroads were built between 1850 and 1900. More railroads helped the economy to grow.

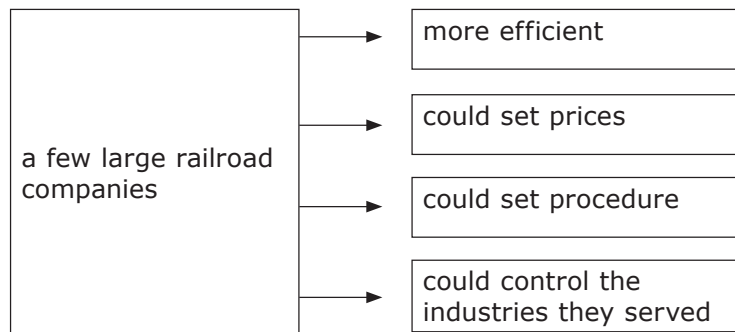
Quick Facts About Railroad Tracks

- In 1860 there were 30,000 miles (48,280 km) of railroad track—almost as much as all the other countries in the world put together.
- By 1900, there were almost 193,000 miles (310,603 km) of railroad track.
- Between 1870 and 1916, workers put down about 11 miles (18 km) of track each day.

There are some well-known songs from that era. Two of the songs are "John Henry" and "I've Been Working on the Railroad." Those who worked on the tracks often sang these songs.

Often, several companies would combine to form one larger company. Combining companies is called **consolidation** (kuhn • sah • luh • DAY • shun). Sometimes large railroad companies would buy up smaller companies. Sometimes large railroad companies would put the smaller companies out of business.

Effects of Consolidation



Powerful businessmen ran large railroads. These men were called **railroad barons** (BEHR • uhnz). One of the first railroad barons was Cornelius Vanderbilt. His railroad began in New York City and ended at the Great Lakes.

James J. Hill was a second railroad baron. His company built the Great Northern Line. This railroad line went from Minnesota west to Washington State.

Collis P. Huntington and Leland Stanford were two other railroad barons. They started a railroad line called the Central Pacific Railroad. The Central Pacific Railroad went

? Drawing Conclusions

1. Reread Quick Facts About Railroad Tracks. What can you conclude about the American economy in the late 1800s?

Ab Defining

2. What is *consolidation*?

✓ Reading Check

3. Name one good thing and one bad thing about consolidation.

Listing

4. List the names of three railroad barons.

The Industrial Age

Lesson 1 Railroads Lead the Way, *Continued*



Mark the Text

5. Underline the meaning of *transcontinental* in the text.



Identifying

6. What was one advantage of large railroad companies? What was one disadvantage?
- _____
- _____
- _____



Explaining

7. How did railroads help the steel industry grow?
- _____
- _____



Understanding Cause and Effect

8. Why did standard gauge track make shipping faster and less expensive?
- _____
- _____
- _____

from California to Utah. It made up part of the transcontinental railroad. Transcontinental means crossing the entire continent.

There were not many laws to control how the railroad barons ran their businesses. They competed fiercely with each other.

One advantage of large railroad companies was that they were efficient. A disadvantage was that they drove small companies out of business. This led to less competition.

Railroads Aid Economic Growth

The growth of railroads changed the United States. More railroads made it easier for factories to get raw materials, such as lumber or iron ore. Trains carried finished goods from factories to places where they were sold. Railroads carried crops from farms to cities.

Industries That Grew Because of Railroads

iron	tracks and locomotive engines
steel	tracks
lumber	wood for railway ties (holds tracks together)
coal	powered the steam engines that pulled railroad cars

Many industries and jobs benefited from the growth of railroads. Railroad companies provided thousands of jobs.

The first railroads only went short distances. Each railroad company had its own kind of railroad tracks. Each company's tracks were of a different gauge (GAYJ). This means the tracks of different companies were different distances apart. The train cars that belonged to one railroad company could not use another company's tracks because they were too narrow or too wide.

This was a problem. If a manufacturer had to use more than one railroad line to ship goods, workers had to unload goods from one train and reload them on another. This slowed down rail travel and made it more expensive.

This problem was solved when companies consolidated. They all began to use tracks that were the same width. This was called **standard gauge** track. Goods no longer had to be unloaded from one train and loaded onto another. This reduced shipping time and shipping costs.

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Lesson 1 Railroads Lead the Way, *Continued*

New technology improved railway transportation.

- George Westinghouse designed air brakes. This made trains safer.
- Eli H. Janney made "car couplers." They made it easier for railroad workers to link cars together.
- Gustavus Swift developed refrigerated railroad cars. This made it possible to keep meat and crops cold. They could be shipped over long distances without spoiling.
- George Pullman developed a "sleeping car." The seats opened out into beds.

Railroad companies competed with each other for customers. Large railroad companies gave their big customers discounts on shipping charges. These discounts were called **rebates**. Smaller railroad companies could not afford to give such discounts. They lost customers to large railroads, and often went out of business.

Large railroads also made secret agreements with each other to form **pools**. Companies in a pool secretly set prices and divided up business. There were some laws to stop railroads from doing things like this, but they were not effective.

The growth of railroads changed the United States. They helped industry expand into the West. They also carried settlers west. They helped people move from rural areas to cities.

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Check for Understanding

List three industries that were helped by the growth of railroads.

What changes did railroads bring to the United States?

Reading Check

9. What were some new technologies that improved railroad travel?

Defining

10. What is a *rebate*?



11. Place a one-tab Foldable over Check for Understanding. Label the anchor tab *Railroads* and draw a railroad track across the middle of the Foldable. Around the track, list words and phrases that you remember about the importance of railroads to the growth of America. Use your Foldable to help answer Check for Understanding.

The Industrial Age

Lesson 2 Inventions Change Society

ESSENTIAL QUESTION

How does technology change the way people live and work?

GUIDING QUESTIONS

1. *How did innovations in communications change society?*
2. *How did new inventions improve people's lives?*
3. *How did the inventions of the late 1800s change society?*

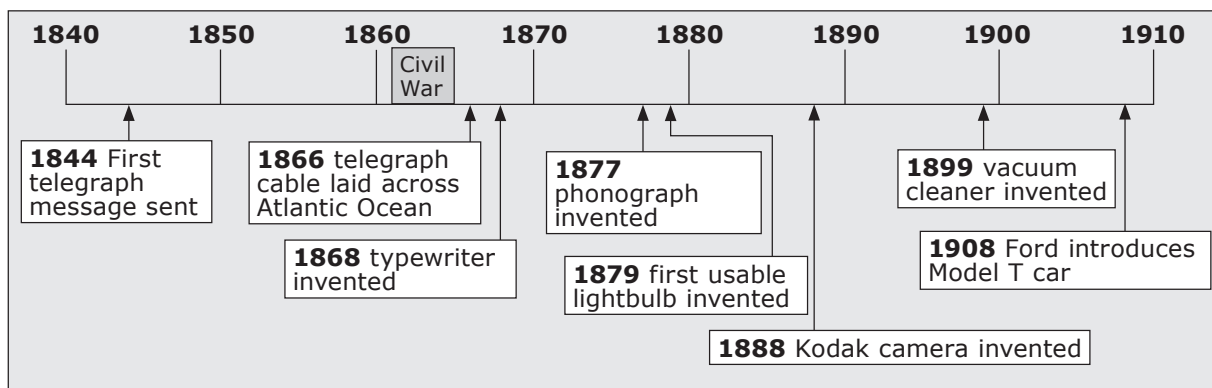
Terms to Know

Model T affordable car made by Ford

assembly line factory method in which work moved past workers who performed a single task

mass production factory production of goods in large quantities

When did it happen?



What do you know?

In the first column, answer the questions based on what you know before you study. After this lesson, complete the last column.

Now ...		Later ...
	Who was the Wizard of Menlo Park?	
	How were telephones and telegraphs similar? How were they different?	

The Industrial Age

Lesson 2 Inventions Change Society, *Continued*

Technology Changes Communications

Samuel Morse developed the telegraph and built the first telegraph line. He sent the first telegraph message in 1844, from Baltimore to Washington, D.C. Within a few short years, there were thousands of miles of telegraph lines in the United States. The Western Union Telegraph Company had operators who were trained to transmit messages in Morse code.

Messages sent by telegraph are called telegrams. Telegrams could be sent almost instantly over long distances.

People used telegrams in many ways. Shopkeepers used them to order goods. News reporters used them to send their news stories to a newspaper office. People used them for sending messages to friends and family.

By 1866, the United States and Europe could send telegraph messages to each other. Up until that time, news or letters were carried across the Atlantic Ocean on ships. It could take weeks for a letter to arrive. In 1866, Cyrus Field laid a telegraph cable across the Atlantic Ocean. This allowed people in Europe and the United States to communicate almost instantly.

Alexander Graham Bell invented another way to communicate quickly. Bell was looking for ways to teach people with hearing loss how to speak. He did experiments with sending voice sounds over electric wires.

By 1876, Bell had invented a telephone. In 1877 Bell formed the Bell Telephone Company. By the 1890s, Bell had sold thousands of phones.

Telephones became part of everyday life. Businesses used phones. Then, people started using phones at home. By the early 1900s, even more people had this new technology. Like the telegraph, the telephone made communicating easier.

The Genius of Invention

Many important inventions came into being in the late 1800s. Between 1860 and 1890 the government processed patents for thousands of new inventions. A patent is a license that says only the inventor has permission to make or sell his or her invention, unless he gives permission to someone else.



Identifying

1. Who developed the telegraph?

2. Who invented the telephone?



Reading Check

3. What is the difference between a telegraph and a telephone?



Drawing Conclusions

4. Why do you think patents are needed?

The Industrial Age

Lesson 2 Inventions Change Society, *Continued*

Reading Check

5. Which of Edison's inventions do you think is most important? Why?

Reading Check

6. Why did Henry Ford build the Model T?

Describing

7. Place a one-tab Foldable along the dotted line. Draw a large circle on the front of the tab and label it *Mass Production*. Draw a smaller circle within the large circle and label it *Assembly Line*. On the front and back of the tab, describe each. Explain their relationship.

Important Inventions of the Late 1800s

Invention	Inventor
typewriter	Christopher Sholes
adding machine	William Burroughs
Kodak camera	George Eastman
vacuum cleaner	John Thurman

The greatest inventor of the time was Thomas Edison. Edison loved science and doing experiments. His mother let him set up a laboratory in the basement.

Edison soon set up a workshop in Menlo Park, New Jersey, in 1876. He invented so many amazing things that people called him "The Wizard of Menlo Park." Some of the things we use every day were invented by Edison. The phonograph (a way of playing recorded sound); the movie projector; and the light bulb were all his inventions.

All these things ran on electricity. In 1882, he built a power station. It made enough electricity to light 85 buildings. Soon, George Westinghouse invented a way to send electricity great distances. Electricity became the power source for homes and businesses.

Some inventors were African American. Lewis Howard Latimer made the light bulb better. Granville Woods invented an electric warmer and improved the braking system for trains. Elijah McCoy found a way to automatically oil machinery. Jan E. Matzeliger invented a machine that made shoes.

A Changing Society

In the early 1900s, most people did not have automobiles. The car was a new invention. Few people could afford to buy one. Henry Ford wanted to change that. He wanted to make a car that was cheap and easy to own. Ford and Charles Sorenson worked to create this car. They named it the **Model T**.

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Ford made the Model T on an **assembly line**. On Ford's assembly line, each worker did one job over and over again. As the Model T moved down the line, it was built a little at a time. The assembly line let Ford make a lot of cars quickly. The cars cost less to make because the assembly line was so efficient.

The Industrial Age

Lesson 2 Inventions Change Society, *Continued*

Because it cost less to make cars, Ford was able to lower the price of his cars. This allowed more people to afford them. Between 1908 and 1926, Ford sold 15 million Model Ts.

Other industries also began using assembly lines to make goods. They made large quantities of goods more quickly than ever before. Making large quantities of goods on an assembly line is called **mass production**.

In the early 1890s, inventors began to experiment with machines that could fly. Samuel Langley built a model airplane that was powered by a steam engine. It flew almost a mile before it ran out of fuel and crashed.

Wilbur and Orville Wright owned a bicycle shop. Between 1900 and 1902 they used their skills as mechanics to design a plane with a gas engine. In September 1903, they began to test their plane. Their test flights were at Kitty Hawk, North Carolina. On December 17, 1903, they made four flights. Their plane flew for just under one minute.

It would take some years for airplanes to be a common part of life, but the first steps had been taken.

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Check for Understanding

What effect did the telegraph have on American society?

Name two other inventions that made people's lives easier and explain how each did so.



Identifying

8. Who built a steam-powered airplane?

9. Who built a gas-powered airplane?



- 10.** Glue two one-tab Foldables together at the anchor tabs. Place the two Foldables over Check for Understanding. Label the top anchor tab *Inventions Bring Change*. Label the top Foldable *Changes in Communication* and the bottom Foldable *Changes in Daily Life*. Make memory maps by drawing three arrows below each title. On the top tab, write three words and phrases about inventions that changed how we communicate. On the bottom tab write three things about inventions that changed daily life. Use your memory maps to help answer Check for Understanding.

The Industrial Age

Lesson 3 An Age of Big Business

ESSENTIAL QUESTION

How does technology change the way people live and work?

GUIDING QUESTIONS

1. *What is the role of the factors of production in making goods and services?*
2. *How did John D. Rockefeller and Andrew Carnegie build fortunes in the oil and steel industries?*

Terms to Know

factors of production land, labor, and capital

entrepreneur person who starts a business

corporation a business in which investors own shares

stock part ownership in a company

shareholder a person who buys stock in a corporation and is a partial owner

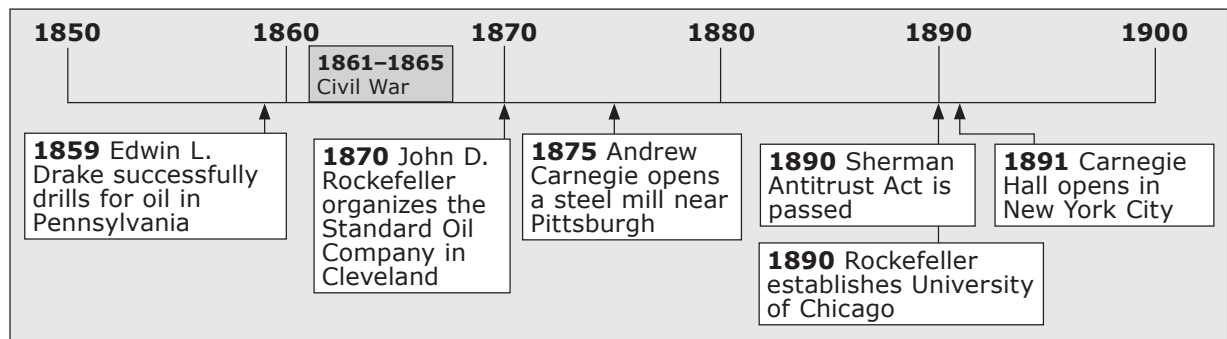
dividend a stockholder's share of a company's profits, usually as a payment

trust a group of companies run by a single board of trustees

monopoly total control of an industry by one person or one company

merger the combining of two or more businesses into one

When did it happen?



What do you know?

In the first column, answer the questions based on what you know before you study. After this lesson, complete the last column.

Now...		Later...
	What does capital have to do with the growth of business?	
	Who was Andrew Carnegie?	
	Why were "trusts" considered to be a problem?	

The Industrial Age

Lesson 3 An Age of Big Business, *Continued*

The Growth of Big Business

Oil, or petroleum, was first used as a kind of medicine. People collected it where it seeped out of the ground. No one drilled for oil like they do today. Later it was discovered that oil could be burned to make heat and light. It could also be used to lubricate machinery. In 1859 Edwin L. Drake drilled an oil well in Titusville, Pennsylvania. This was the beginning of the modern oil industry.

Industry developed rapidly in the late 1880s. The United States economy was changing from one based on farming to one based on industry.

Industry is based on the **factors of production**. The factors of production are the things needed to produce something. There are three factors of production: land, labor, and capital. Anyone who has a business is using the three factors of production.

1. *Land* refers to the land itself. For example, a furniture factory needs to be located somewhere. Land also refers to natural resources, or things in nature that are used to make goods. For example, the furniture factory uses the natural resource of trees to make wooden furniture.
2. *Labor* means work. The workers at the factory provide the labor.
3. *Capital* means things people use to make products. The tools that the workers use are capital. So is the factory building itself. Capital also refers to the money a business has to spend.

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After the Civil War, many business owners wanted to raise capital so their businesses would grow. People who start businesses and run them are called **entrepreneurs** (ahn•truh•pruh•NURZ). To raise capital, many entrepreneurs formed corporations.

A **corporation** is a way to organize a company. It also allows many people to share ownership of one company.

The business owner sells small shares of the company to many investors. These shares of the company are called **stock**. The investors are called **shareholders**. By selling shares to shareholders, the business gets the money, or *capital*, it needs to operate or grow larger.

If the business does well and makes a profit, shareholders are given part of the profit. Payments to shareholders are called **dividends**.

Listing

1. What are the three factors of production?

1. _____
2. _____
3. _____

Reading Check

2. Why is capital important for economic growth?

FOLDABLES®

Defining

3. Place a two-tab Foldable along the dotted line. Cut the two tabs in half to make four tabs. Label the anchor tab *Corporations*. Label the four tabs *entrepreneurs*, *shareholders*, *stock*, and *dividends*. On the tabs, define each term as it relates to corporations.

Identifying

4. Who buys stock?

The Industrial Age

Lesson 3 An Age of Big Business, *Continued*



Visualize It

5. How is vertical integration different from horizontal integration?



Reading Check

6. How did Standard Oil become a monopoly?



Identifying

7. Name two men who ran successful businesses in the late 1800s. What business was each one in?



Defining

8. What is the Bessemer process?

The Growth of Oil and Steel

John D. Rockefeller was a very successful businessman. In 1870 he started an oil company called the Standard Oil Company. Rockefeller used a plan called "horizontal integration" to build his business. This means he combined companies that were competing with him into one company. Standard Oil grew powerful and wealthy.

Horizontal Integration



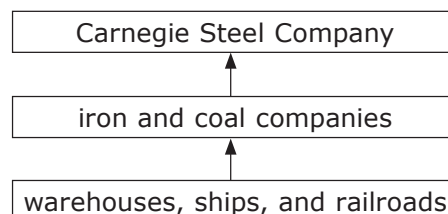
In 1882, Rockefeller formed an oil **trust**. A trust is a group of companies headed by one single board of trustees. Rockefeller's trust controlled many different oil companies. It controlled the entire oil industry. When one business or person has total control of an industry, that business or person is said to have a **monopoly**.

Andrew Carnegie was another very successful businessman of the late 1800s. Carnegie, however, made his fortune in steel.

A man named Henry Bessemer invented a new way to make large amounts of steel cheaply. It was called the Bessemer process. Carnegie learned about the Bessemer process. He then opened a steel plant near Pittsburgh, Pennsylvania.

Carnegie used "vertical integration" to build his business. This means that he bought companies that provided things he needed to make steel. For example, he bought iron and coal mines. He also bought railroads and ships to bring these raw materials to his factories. That way, he did not have to pay a lot for the things he needed to run his steel business. The Carnegie Steel Company was very successful. By 1900, this one company made one-third of the nation's steel.

Vertical Integration



The Industrial Age

Lesson 3 An Age of Big Business, *Continued*

Both Rockefeller and Carnegie earned hundreds of millions of dollars. They became philanthropists. A philanthropist is a person who gives money to good causes. Carnegie built the concert hall Carnegie Hall in New York City. He also paid to build many libraries across the United States and the world. Rockefeller established the University of Chicago and New York's Rockefeller Institute for Medical Research.

In the late 1800s, corporations grew larger. Many did so through **mergers**. A merger is when companies combine.

Many people thought that corporations had too much power. Because of this, Congress passed a law called the Sherman Antitrust Act. This law made trusts and monopolies illegal. At first, however, it had little effect.

Check for Understanding

List the factors of production and the role each plays in manufacturing.

How did breakthroughs in technology lead to the rise of big business? Give one example.



Mark the Text

9. Underline the definition of *philanthropist*.



Finding the Main Idea

10. Why did Congress pass the Sherman Antitrust Act?



11. Place a two-tab Foldable along the dotted line to cover Check for Understanding. Label the top tab *Industry*, and the bottom tab *Agriculture*. Draw an arrow from the bottom tab to the top tab to show the movement of the American economy from an agriculture-based economy to an industry-based economy. Write words and phrases to record what you remember about each. Use your Foldable to answer Check for Understanding.

The Industrial Age

Lesson 4 Workers in the Industrial Age

ESSENTIAL QUESTION

How does technology change the way people live and work?

GUIDING QUESTIONS

1. *How did working conditions change during the Industrial Age?*
2. *Why did workers form labor unions?*

Terms to Know

sweatshop a shop or factory where workers work long hours at low wages under unhealthy conditions

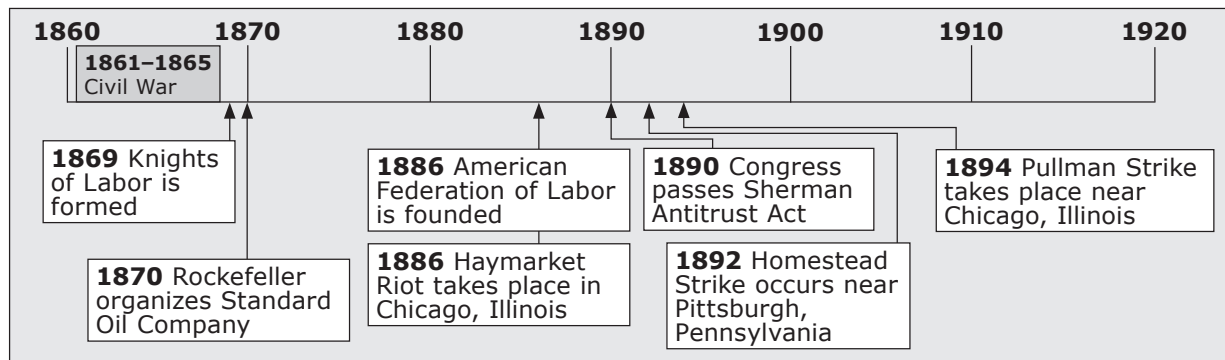
labor union organization of workers who seek better pay and working conditions

collective bargaining discussion between an employer and labor union representatives about wages, hours, and working conditions

strikebreaker person hired to replace a striking worker in order to break up a strike

injunction a court order to stop something from happening

When did it happen?



What do you know?

In the first column, answer the questions based on what you know before you study. After this lesson, complete the last column.

Now...		Later...
	Who was Mother Jones and what was she known for?	
	Who would call in a strikebreaker?	

The Industrial Age

Lesson 4 Workers in the Industrial Age, *Continued*

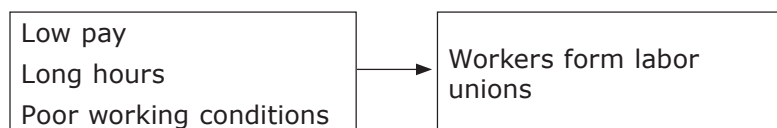
The Industrial Workforce

Industrial growth created many jobs, but the working conditions were terrible. Industrial workers labored six days a week for 10 to 12 hours a day. (Today, workers usually work five days a week, eight hours a day, for a total of 40 hours.) They worked in unsafe and unhealthy factories and mines. Garment workers worked in crowded and dangerous factories called **sweatshops**.

By 1900, more than one million women worked in industry. Women were paid about half of what men were paid for the same work. Hundreds of thousands of children under 16 also worked. Many children worked more than ten hours a day.

The Growth of Labor Unions

Workers were unhappy with their low pay and poor working conditions. So they organized into groups to demand better pay and working conditions. These groups are called **labor unions**. Workers hoped that labor unions would improve their lives. They hoped for higher pay, shorter hours, and better working conditions.



The Knights of Labor was an important early labor union. It was founded in Philadelphia, Pennsylvania, in 1869. By the 1880s, the Knights of Labor had grown to be a national union. Unlike other unions, the Knights welcomed women, African Americans, immigrants, and unskilled laborers as members. Terrence V. Powderly led the Knights of Labor. The union had more than 700,000 members in the 1880s.

The American Federation of Labor (AFL) was another important labor organization. It was formed in 1886. The AFL represented skilled workers of many kinds. Its leader was Samuel Gompers. Gompers and the AFL worked for higher wages, shorter hours, and better working conditions. They fought for the right of collective bargaining. **Collective bargaining** is when unions discuss with business owners ways to improve wages and conditions for all the company's workers.

Many unions would not let women join. So some women formed their own unions. Some women became important labor leaders. One such leader was Mary Harris Jones.



Describing

- Write three words that describe factory working conditions during the late 1800s.



Reading Check

- How many hours a week did industrial workers work?



Finding the Main Idea

- Why did workers form labor unions?



Mark the Text

- Circle the name of the union that was founded in 1869. Who was its leader?



Identifying

- What does AFL stand for?

The Industrial Age

Lesson 4 Workers in the Industrial Age, *Continued*

Determining Cause and Effect

6. Why did so many people die in the Triangle Shirtwaist Company fire?

Critical Thinking

7. Why is a strike not effective if strikebreakers are called in?

Determining Cause and Effect

8. Name two effects of the Haymarket Riot.

Sequencing

9. What happened at Andrew Carnegie's factory *just after* the governor sent soldiers to protect the strikebreakers?

Workers called her "Mother Jones" because she fought so hard for their rights. Mother Jones spent 50 years fighting for workers' rights.

In 1911 a terrible fire broke out at a women's clothing factory in New York City. The factory was owned by the Triangle Shirtwaist Company. (A shirtwaist is a type of woman's blouse.) The factory was a sweatshop. The workers were mostly young immigrant women. They could not escape the fire. Why? The company had locked the doors. Nearly 150 people died. This fire led to more demands for safer workplaces. A union called the International Ladies' Garment Workers Union (ILGWU) led these demands.

Economic depression hit working people hard in the 1870s and 1890s. In 1873, companies cut their costs by paying workers less. Some companies laid off workers.

Labor unions responded by having many workers go on strike. Sometimes strikes turned violent. One example was in 1877. Companies hired workers called **strikebreakers**. Strikebreakers took the place of the striking workers, and the work continued.

In 1886, striking workers gathered in Haymarket Square in Chicago. They were striking against the McCormick Harvester Company. The strikers wanted an eight-hour workday. Police broke up the rally and injured several strikers.

The next day, a large crowd gathered to protest what had happened to the workers. The police tried hard to break up the crowd.

Someone threw a bomb, which killed a policeman. A riot started, and more people were killed and injured. This event is known as the Haymarket Riot. It turned many people against labor unions. It made people think that labor unions caused violence.

Another important strike took place in 1892. Workers went on strike at Andrew Carnegie's steel plant in Homestead, Pennsylvania. The strikers were protesting cuts to their wages.

The managers of the plant hired strikebreakers. They were not members of the union. The managers hired guards to protect the strikebreakers. The guards and striking workers fought, and at least ten people died.

Pennsylvania's governor sent soldiers to protect the strikebreakers. The plant reopened with nonunion workers. Membership in the steelworkers union dropped.

The Industrial Age

Lesson 4 Workers in the Industrial Age, *Continued*

Two years later, in 1894, there was another dramatic, violent strike. It is called the Pullman Strike because it took place at George Pullman's railway-car factory near Chicago.

Pullman's workers went on strike when the company cut their wages. Members of a railroad workers' union helped the strikers. They refused to take care of trains that included Pullman cars.

Pullman and the railroad owners fought back. They convinced government leaders to get an **injunction**. This was a court order. It forced the union to handle the trains. The government said the union workers were blocking the railways "and holding up the mails." The strike went on, however. President Grover Cleveland sent in soldiers to end the strike.

The failure of the Pullman Strike was another blow to the union movement. Still, workers continued their efforts to get better pay and better working conditions.

Check for Understanding

Identify three things that labor unions tried to change.

Why did unions become more popular during the Industrial Age?



Explaining

10. Why did the government order railroad workers to take care of all trains?



Reading Check

11. Why did many people turn against unions in the late 1800s?



12. Place a three-tab Foldable along the dotted line to cover Check for Understanding. Label the top tab *Employers*, the middle tab *Labor Unions* and the bottom tab *Employees*. On the the tabs, write words and phrases that you remember about each and explain how Labor Unions were in the middle of these two groups. Use your Foldable to help answer Check for Understanding.