Module 13

The North

Essential Question
How did the Industrial Revolution help shape life in the North?

In this module you will read about the changes that occurred in the lives of Americans in the North as the result of rapid industrialization. You will also learn about some of the new inventions of the period.

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The Big Idea  Advances in technology led to new inventions that continued to change daily life and work.

About the Photo: New machinery like this textile mill helped fuel the Industrial Revolution.

Explore ONLINE!

VIDEOS, including...
- Industrial Revolution
- Train Technology

- Document-Based Investigations
- Graphic Organizers
- Interactive Games
- Image Carousel: Elements of Mass Production
- Image with Hotspots: Life of a Mill Girl
- Image with Hotspots: The Steam Train
### United States

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1785</td>
<td>The first steam-powered mill opens in Great Britain.</td>
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<tr>
<td>1807</td>
<td>Robert Fulton’s <em>Clermont</em> becomes the first commercially successful steamboat.</td>
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<tr>
<td>1830</td>
<td>The <em>Tom Thumb</em> becomes the first locomotive in the United States to carry passengers.</td>
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<tr>
<td>1840</td>
<td>Federal government employees receive a 10-hour workday.</td>
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<tr>
<td>1845</td>
<td>Sarah G. Bagley is appointed secretary of the New England Working Men’s Association.</td>
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<tr>
<td>1856</td>
<td>Gail Borden patents a method of condensing milk so that it can safely be stored in cans.</td>
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### World

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>1790</td>
<td>The first steam-powered mill opens in Great Britain.</td>
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<tr>
<td>1838</td>
<td>The <em>Sirius</em> becomes the first ship to cross the Atlantic Ocean entirely on steam power.</td>
</tr>
<tr>
<td>1846</td>
<td>German astronomer Johann Galle observes that Neptune is a planet.</td>
</tr>
<tr>
<td>1851</td>
<td>London’s Great Exhibition displays inventions from around the world in the Crystal Palace.</td>
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Reading Social Studies

THEME FOCUS:
Science and Technology, Economics

As you read this module, you will learn about how developments in science and technology brought about what is called the Industrial Revolution. As a result of the Industrial Revolution, you will see how American economic patterns changed. Next, you will read about how family life changed as more and more people went to work in factories. Finally, you will see how new methods of transportation changed where people lived and how new inventions affected daily life and work.

READING FOCUS:
Understand Causes and Effects in History

Have you heard the saying, “We have to understand the past to avoid repeating it.”? That is one reason we look for causes and effects in history.

Cause and Effect Chains  You might say that all of history is one long chain of causes and effects. It may help you to understand the course of history better if you draw out such a chain as you read.

Since the 1790s, wars between European powers had interfered with U.S. trade. American customers were no longer able to get all the manufactured goods they were used to buying from British and European manufacturers . . . Americans began to buy the items they needed from American manufacturers instead of from foreign suppliers. As profits for American factories grew, manufacturers began to spend more money expanding their factories. . . .

At the same time, many Americans began to realize that the United States had been relying too heavily on foreign goods.
You Try It!

The following passage is from the module you are about to read. As you read each paragraph, ask yourself what is the cause and what is the effect of what is being discussed.

Workers Organize  Factories continued to spread in the 1800s. Craftspeople, who made goods by hand, felt threatened. Factories quickly produced low-priced goods. To compete with factories, shop owners had to hire more workers and pay them less. . . .

The wages of factory workers also went down as people competed for jobs. A wave of immigration in the 1840s brought people from other, poorer countries. They were willing to work for low pay. More immigrants came to the Northeast, where the mills were located, than to the South. Competition for jobs also came from people unemployed during the financial Panic of 1837.

After you have read the passage, answer the following questions.

1. What cause is being discussed in the first paragraph? What were its effects?

2. Draw a cause and effect chain that shows the events described in the first paragraph.

3. What main effect is discussed in the second paragraph? How many causes are given for it?

4. Draw a cause and effect chain that shows the events described in the second paragraph.

As you read Module 13, look for words that signal causes or effects. Picture these causes and effects as the links in a cause and effect chain.
The Big Idea
The Industrial Revolution transformed the way goods were produced in the United States.

Main Ideas
■ The invention of new machines in Great Britain led to the beginning of the Industrial Revolution.
■ The development of new machines and processes brought the Industrial Revolution to the United States.
■ Despite a slow start in manufacturing, the United States made rapid improvements during the War of 1812.

Key Terms and People
Industrial Revolution
textiles
Richard Arkwright
Samuel Slater
technology
Eli Whitney
interchangeable parts
mass production

If YOU were there . . .
You live in a small Pennsylvania town in the 1780s. You earn money for your family by raising sheep and spinning their wool into yarn. Your sisters knit the yarn into gloves and mittens that you sell to city merchants. But now you hear that someone has invented machines that can spin thread and make cloth.

Would you still be able to earn the same amount of money for your family? Why?

The Industrial Revolution
At the start of the 1700s, the majority of people in Europe and the United States were farmers. They made most of what they needed by hand. For example, female family members usually made clothing. First, they used a spinning wheel to spin raw materials, such as cotton or wool, into thread. Then they used a hand loom to weave the thread into cloth.

Some families produced extra cloth to sell to merchants, who sold it for a profit. In towns, a few skilled craftspeople made goods by hand in their own shops. Workers including blacksmiths, carpenters, and shoemakers specialized in their work and the goods that they produced. Their ways of life had stayed the same for generations.

A Need for Change  By the mid-1700s, however, changes in Great Britain led to a greater demand for manufactured goods. As agriculture and roads improved, cities and populations grew. Overseas trade also expanded. Traditional manufacturing methods did not produce enough goods to meet everyone’s needs.

People began using machines to create processes that made goods in more efficient ways. They also discovered new power resources to fuel the machines. These developments led to the Industrial Revolution, a period of rapid growth in using machines for manufacturing and production that began in the mid-1700s.
Textile Industry  The first important breakthrough of the Industrial Revolution took place in how textiles, or cloth items, were made. Before the Industrial Revolution, spinning thread took much more time than making cloth. Several skilled workers were needed to spin enough thread to supply a single weaver.

In 1769 British entrepreneur Richard Arkwright invented a large spinning machine called a water frame. The water frame could produce dozens of cotton threads at the same time. It lowered the cost of cotton cloth and increased the speed of textile production.

The water frame used flowing water as its source of power. Merchants began to build large textile mills, or factories, near rivers and streams. The mills were filled with spinning machines. Merchants began hiring people to work in the mills.

Additional improvements also speeded up the spinning process. Britain soon had the world’s most productive textile manufacturing industry.

New Machines and Processes

New machines encouraged the rise of new processes in business and manufacturing. As the machines used to make products became more efficient, the processes involved changed dramatically.

Slater and His Secrets  The new textile machines allowed Great Britain to produce cloth more quickly and inexpensively than other countries could. To protect British industry, the British Parliament had made it illegal for skilled mechanics or machine plans to leave the country. Disguised as a farmer, Samuel Slater, a skilled British mechanic, immigrated to the United States after carefully memorizing the designs of textile mill machines. Soon after arriving, he sent a letter to Moses Brown, who owned a textile business in New England. Slater claimed he could improve the way textiles were manufactured in the United States.

Brown had one of his workers test Slater’s knowledge of machinery. Slater passed. Brown’s son, Smith Brown, and son-in-law, William Almy, formed a partnership with Slater. Economic freedom in the United States allowed entrepreneurs such as Slater, Brown, and Almy to take risks by using their money and talents to launch new ventures. In 1793 they opened their first mill in Pawtucket, Rhode Island. The production of...
cotton thread by American machines had begun. Slater ran the mill and the machinery. He was confident that his new machines would work well.

“If I do not make as good yarn as they do in England, I will have nothing for my services, but will throw the whole of what I have attempted over the bridge.”

—Samuel Slater, from Memoir of Samuel Slater

Slater could have lost all of his investment, but his machines worked and the Pawtucket mill became a success. Slater’s wife also invented a new cotton thread for sewing. In 1798 Slater formed his own company to build a mill. By the time he died in 1835, he owned all or part of 13 textile mills.

Other Americans began building textile mills. Most were located in the Northeast. In New England, in particular, merchants had the money to invest in new mills. More importantly, the physical environment in this region was made up of many rivers and streams that provided a reliable supply of power. Fewer mills were built in the South, partly because investors in the South concentrated on expanding agriculture. There, agriculture was seen as an easier way to make money. The expansion of industrialization in the North and the South’s concentration on agriculture caused the two regions to develop significant economic and cultural differences.

A Manufacturing Breakthrough Despite these great changes in machines and processes, most manufacturing was still done by hand. In the late 1790s the U.S. government worried about a possible war with France, so it wanted more muskets for the army. Skilled workers made the parts for each weapon by hand. No two parts were exactly alike, and carefully fitting all the pieces together took much time and skill.

As a result, American gunmakers could not produce the muskets quickly enough to satisfy the government’s demand. Factories needed better technology, the tools used to produce items or to do work.

In 1798 inventor Eli Whitney tried to address some of these problems. Whitney gave officials a proposal for mass-producing guns for the U.S. government using water-powered machinery. Whitney explained the benefits of his ideas.

“I am persuaded that machinery moved by water [and] adapted to this business would greatly reduce the labor and facilitate [ease] the manufacture of this article.”

—Eli Whitney to Secretary of the Treasury Oliver Wolcott

Whitney also came up with the idea of using interchangeable parts—parts of a machine that are identical. Interchangeable parts became important because each part does not have to be custom-made by hand, so it saves production time. Using interchangeable parts made machines easier to assemble and broken parts easier to replace. Whitney promised to build 10,000 muskets in two years. The federal government gave him money to build his factory, and in 1801 he was called to Washington, DC, to give a demonstration.
Whitney stood before President John Adams and his secretary of war. He had an assortment of parts for ten guns. He then randomly chose parts and quickly assembled them into muskets. To the audience’s amazement, he repeated the process several times.

Whitney’s ideas helped businesses in the manufacturing industry determine the best way to produce the goods that consumers in the American market needed. He had proven that American inventors could improve upon the new British technology. Machines that produced matching parts soon became the standard in industry. Interchangeable parts sped up mass production, the efficient production of large numbers of identical goods. Mass-production techniques allowed manufacturers to efficiently create more goods for the marketplace.

Manufacturing Grows Slowly

Despite the hard work of people such as Samuel Slater and Eli Whitney, manufacturing in the United States grew slowly. In 1810 Secretary of the Treasury Albert Gallatin described some of the obstacles faced by potential factory owners in the United States.

“[The reasons include] . . . the superior attractions of agricultural pursuits [farming], . . . the abundance of land compared with the population, the high price of labor, and the want [lack] of sufficient capital [investment].”

—Albert Gallatin, from The Writings of Albert Gallatin

Gallatin and others believed that few people would choose to work in a factory if they could own their own farm instead. In Great Britain, on the other hand, land was more scarce and more expensive than in the United States.
States. As a result, fewer people were able to own farms. British factory workers generally were willing to work for lower wages than factory workers in the United States were.

Because British manufacturers had plenty of factory workers with technical skills, they could produce large amounts of goods less expensively than most American businesses could. As a result, they could charge lower prices for the goods. Lower British prices made it difficult for many American manufacturers to compete with British companies. This situation in turn discouraged American investors from spending the money needed to build new factories and machinery. As a result, only a few industries had found a place to compete in the American market economy. These included cotton goods, flour milling, weapons, and iron production.

These circumstances began to change around the time of the War of 1812. Since the 1790s, conflict and wars between European powers had interfered with U.S. trade. Some goods became scarce, as American consumers were no longer able to get all the manufactured goods they were used to buying from British and European manufacturers. Then, during the War of 1812, British ships blockaded eastern seaports, preventing foreign ships from delivering goods. Americans began to buy the items they needed from American manufacturers instead of from foreign suppliers. As profits for American factories grew, manufacturers began to spend

Link to Today

Modern Manufacturing

The word manufacture comes from Latin words that mean “to make by hand.” Yet in modern manufacturing, machines—not human hands—do most of the work.

A key feature of modern manufacturing is the assembly line. An assembly line is a long conveyer belt. As the product moves along the belt, or “down the line,” workers assemble it. Often, the workers use machines to help them. On a growing number of assembly lines, there are no workers at all: the product is assembled by computer-controlled robots.

Although a far cry from Eli Whitney’s factory, modern factories use the same elements of mass production that Whitney did more than 200 years ago.

Analyze Information

How do interchangeable parts help the modern assembly line work?
more money expanding their factories. State banks and private investors began to lend money to manufacturers for their businesses.

At the same time, many Americans began to realize that the United States had been relying too heavily on foreign goods. If the United States could not meet its own needs, it might be weak and open to attack. Former president Thomas Jefferson, who had once opposed manufacturing, changed his mind. He, too, realized that the United States was too dependent on imports.

“To be independent for the comforts of life we must fabricate [make] them ourselves. We must now place the manufacturer by the side of the agriculturalist [farmer].”

—Thomas Jefferson, from Memoir, Correspondence, and Miscellanies from the Papers of Thomas Jefferson

In February 1815, New Yorkers celebrated the end of the War of 1812 and the return of free trade. The streets were decorated and filled with merchants whose ships were loaded with goods. “With Peace and Commerce, America Prospers,” declared one display. Eager businesspeople prepared to lead the United States into a period of industrial and economic growth. These merchants and industrialists urged northern politicians to pass higher tariffs on foreign goods to protect American companies.

Summary and Preview The Industrial Revolution started with the textile industry in England but soon spread to the United States. In the next lesson you will learn about how the spread of factories changed the working lives of many Americans.

Lesson 1 Assessment

Review Ideas, Terms, and People
1. a. Identify What was the first industry to begin to use machines to manufacture goods?
   b. Analyze What were some causes of the Industrial Revolution, and what effect did it have on the way products were made?
   c. Predict In what ways might life for workers change as a result of the Industrial Revolution?
2. a. Recall In what part of the United States were most mills located? Why?
   b. Draw Conclusions How did the ideas of Samuel Slater and Eli Whitney affect manufacturing in the United States?
   c. Evaluate Whose contributions do you think were more important—Slater’s textile machines or Whitney’s interchangeable parts? Why?
3. a. Explain How did conflict in Europe influence economic growth in America?
   b. Contrast Why was manufacturing in Great Britain in the early years more successful than that in the United States?

Critical Thinking
4. Draw Conclusions In this lesson you learned about the changes in manufacturing and the effect those changes had in the early 1800s. Create a chart similar to the one below and use it to show how each contribution affected manufacturing.

<table>
<thead>
<tr>
<th>Invention/Improvement</th>
<th>Effect on Manufacturing</th>
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Lesson 2

Changes in Working Life

The Big Idea
The introduction of factories changed working life for many Americans.

Main Ideas
■ The spread of mills in the Northeast changed workers’ lives.
■ The Lowell system revolutionized the textile industry in the Northeast.
■ Workers organized to reform working conditions.

Key Terms and People
Rhode Island system
Francis Cabot Lowell
Lowell system
trade unions
strikes
Sarah G. Bagley

If YOU were there . . .
You live on a dairy farm in Massachusetts in about 1820. On the farm, you get up at dawn to milk the cows, and your work goes on until nighttime. But now you have a chance at a different life. A nearby textile mill is hiring young people. You would leave the farm and live with other workers. You could go to classes. Most importantly, you could earn money of your own.

Would you go to work in the textile mill? Why?

Mills Change Workers’ Lives
Workers no longer needed the specific skills of craftspeople to run the machines of the new mills. The lives of workers changed along with their jobs. Resistance to these changes sometimes sparked protests.

Many mill owners in the United States could not find enough people to work in factories because other jobs were available. At first, Samuel Slater and his two partners used apprentices—young men who worked for several years to learn the trade. However, they often were given only simple work. For example, their jobs might include feeding cotton into the machines and cleaning the mill equipment. They grew tired of this work and frequently left. Apprentice James Horton, for example, ran away from Slater’s mill. “Mr. Slater . . . keep me always at one thing . . . ,” Horton complained. “I might have stayed there until this time and never knew nothing.”

Eventually, Slater began to hire entire families who moved to Pawtucket to work in the mills. This practice allowed Slater to fill his labor needs at a low cost. Children as well as adults worked in the mills.

On most farms children worked to help their families. Therefore, few people complained about the hiring of children to work in factories. H. Humphrey, an author of books on raising children, told parents that children needed
to be useful. Humphrey wrote, “If he [a child] will not study, put him on to a farm, or send him into the shop, or in some other way provide regular employment for him.” The machines made many tasks in the mill simple enough for children to do. Mill owners profited because they paid children low wages. Adults usually earned as much in a day as most children did in a week.

To attract families to his mill, Slater built housing for the workers. He also provided them with a company store where they could buy necessities. In addition, he started the practice of paying workers with credit at the company store. Instead of paying the full price for an item all at once, small payments could be made over a period of time. This practice allowed Slater to reinvest his money in his business.

Slater’s strategy of hiring families and dividing factory work into simple tasks became known as the **Rhode Island system**. Mill owners throughout the Northeast copied Slater’s methods. Owners advertised with “Men with growing families wanted.” They also sent recruiters to poor communities to find new workers. For many people, the chance to work in a factory was a welcome opportunity to earn money and to learn a new skill.

One of the earliest of the mill towns, Slater’sville, was named after Samuel Slater. The town was built by Slater and his brother John. It included two houses for workers and their families, the owner’s house, the company store, and the Slater’sville Mill. The mill was the largest and most modern industrial building of its time.

The mills employed not only the textile workers who operated the machinery but also machine part makers and dam builders. Although the company store sold food and necessary items to workers, mill towns supported the same variety of businesses any other town needed to thrive. These included tailors and dressmakers, butchers, and other small workshops.

### The Lowell System

Not all mill owners followed this system. Francis Cabot Lowell, an entrepreneur from New England, developed a very different approach. His ideas completely changed the textile industry in the Northeast.

The **Lowell system** was based on water-powered textile mills that employed young, unmarried women from local farms. The system included a loom that could both spin thread and weave cloth in the same mill. Lowell constructed boardinghouses for the women. Boardinghouse residents were given a room and meals along with their jobs.

With financial support from investors of the Boston Manufacturing Company, Lowell’s first textile mill opened in Waltham, Massachusetts, in 1814. “From the first starting of the first power loom there was not . . . doubt about the success,” wrote one investor. In 1822 the company built a larger mill in a Massachusetts town later named Lowell. Visitors to Lowell were amazed by the clean factories and neatly kept boardinghouses as well as the new machinery.
The young women working in the mills soon became known as Lowell girls. The mills paid them between $2 and $4 each week. The workers were required to pay $1.25 for room and board. These wages were much better than the wages women could earn per week in other available jobs, such as domestic work.

Many young women came to Lowell from different parts of New England. They wanted the chance to earn money instead of working on the family farm. Working in the Lowell mills gave young women the opportunity to achieve economic independence. “I must of course have something of my own before many more years have passed over my head,” wrote one young woman. The typical Lowell girl worked at the mills for about four years.

The Lowell system aimed to overcome the perception that factory workers had a lower social status. Unlike other factory workers, the Lowell girls were encouraged to use their free time to take classes and form women’s clubs. They even wrote their own magazine, the *Lowell Offering*. Lucy Larcom, who started working in the Lowell mills at age 11, later praised her fellow workers:
“I regard it as one of the privileges [advantages] of my youth that I . . . [grew] up among those active, interesting girls, whose lives . . . had principle [ideals] and purpose distinctly their own.”

—Lucy Larcom, from *A New England Girlhood*

Mill life was hard, however. The workday was between 12 and 14 hours long, and daily life was carefully controlled. Ringing bells ordered workers to breakfast or lunch. Employees had to work harder and faster to keep up with new equipment. Cotton dust also began to cause health problems, such as chronic cough, for workers.

## Workers Organize

Factories continued to spread in the 1800s. Craftspeople, who made goods by hand, felt threatened because factories were able to produce low-priced goods more quickly. To compete with factories, shop owners had to hire more workers and pay them less. Shoemaker William Frazier complained about the situation in the mid-1840s. “We have to sit on our seats from twelve to sixteen hours per day, to earn one dollar.”

The wages of factory workers also went down as people competed for jobs. A wave of immigration in the 1840s brought people from other, poorer countries. They were willing to work for low pay. More immigrants came to the Northeast, where the mills were located, than to the South. Competition for jobs also came from people unemployed during the financial Panic of 1837. For example, about 50,000 workers in New York City alone lost their jobs.

### The Beginning of Trade Unions

Facing low wages and the fear of losing their jobs, skilled workers formed trade unions, groups that tried to improve pay and working conditions. Eventually, unskilled factory workers also formed trade unions, seeking economic equity. Most employers did not want to hire union workers. Employers believed that the higher cost of union employees prevented competition with other manufacturers.

Sometimes, labor unions staged protests called strikes. Workers on strike refuse to work until employers meet their demands. Most early strikes were not successful, however. Courts and police usually supported companies, not striking union members.

### Labor Reform Efforts

A strong voice in the union movement was that of millworker Sarah G. Bagley. She wrote magazine articles and made speeches about working in the mills. She organized workers to help change conditions. Bagley founded the Lowell Female Labor Reform Association in 1844 and publicized the struggles of factory laborers. The association’s two main goals were to influence an investigation of working conditions by the Massachusetts state legislature and to obtain a ten-hour workday. Members of the association passed out pamphlets and circulated petitions.

President Martin Van Buren had granted a ten-hour workday in 1840 for many federal employees. Bagley wanted this rule to apply to employees.
of private businesses. These men and women often worked 12 to 14 hours per day, six days per week.

Many working men and women supported the ten-hour-workday campaign, despite the opposition of business owners. In 1845 Sarah G. Bagley was elected vice president of the New England Working Men’s Association. She was the first woman to hold such a high-ranking position in the American labor movement.

Over time, the unions achieved some concrete legal victories. Connecticut, Maine, New Hampshire, Ohio, Pennsylvania, and a few other states passed ten-hour-workday laws.

For factory workers in other states, long hours remained common. One witness described how children were “summoned by the factory bell before daylight” and worked until eight o’clock at night “with nothing but [a] recess of forty-five minutes to get their dinner.” Union supporters continued to fight for work reforms such as an end to child labor in factories during the 1800s.

**Summary and Preview** With the growth of factories, workers faced new opportunities and challenges. In the next lesson you will learn about how the Transportation Revolution brought changes to commerce and the daily lives of Americans.

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### Lesson 2 Assessment

**Review Ideas, Terms, and People**

1. **a. Identify** What problems did many mill owners have in finding workers?
   
   **b. Analyze** How did Samuel Slater’s Rhode Island system change employment practices in mills?

2. **a. Describe** What was life like for mill workers in the Lowell system?
   
   **b. Make Inferences** Why would young women have wanted to go to work in the Lowell mills?

3. **a. Recall** Why did workers form trade unions?
   
   **b. Predict** What are some possible problems that might arise between factory owners and trade unions?

### Critical Thinking

**4. Draw Conclusions** In this lesson you learned about mill life and the effect conditions had on workers. Create a chart similar to the one below to show how Samuel Slater, Francis Cabot Lowell, and Sarah G. Bagley affected workers’ lives.
The Transportation Revolution

The Big Idea
New forms of transportation improved business, travel, and communication in the United States.

Main Ideas
- The Transportation Revolution affected trade and daily life.
- The steamboat was one of the first developments of the Transportation Revolution.
- Railroads were a vital part of the Transportation Revolution.
- The Transportation Revolution brought many changes to American life and industry.

Key Terms and People
Transportation Revolution
Robert Fulton
Clermont
Gibbons v. Ogden
Peter Cooper

If YOU were there . . .
You live in a small town in Iowa in the 1860s. You’ve never been more than 30 miles from home and have always traveled by wagon or on horseback. Now there are plans to build a railroad westward from Chicago, 200 miles to the east. The tracks will come through your town! Twice a week, trains will bring goods from the city and take people farther west.

How would the coming of the railroad change your life?

Trade and Daily Life
During the 1800s the United States was transformed by a Transportation Revolution—a period of rapid growth in the speed and convenience of travel because of new methods of transportation. The Transportation Revolution created a boom in business across the country, particularly by reducing shipping time and costs. As one foreign observer declared in 1835, “The Americans . . . have joined the Hudson to the Mississippi, and made the Atlantic Ocean communicate with the Gulf of Mexico.”

These improvements were made possible largely by the invention of two new forms of transportation: steamboats and steam-powered trains. They enabled goods, people, and information to travel rapidly and efficiently across the United States.

Steamboats
American and European inventors had developed steam-powered boats in the late 1700s. However, they were not in wide use until the early 1800s.

Steamboat Era In 1803 American Robert Fulton tested his first steamboat design in France. Several years later, he tested the first full-sized commercial steamboat, called the Clermont, in the United States. On August 9, 1807,
the Clermont traveled against the current up the Hudson River without trouble. Demand for steamboat ferry service soon arose.

The steamboat was well suited for river travel. It could move upriver and did not rely on wind power. Steamboats and the location of rivers in the United States created new economic opportunities during the 1800s. Steamboats increased trade and profits because goods could be moved quickly and thus more cheaply. More than 500 steamboats were in use in the United States by 1840. By the 1850s steamboats were also being used to carry people and goods across the Atlantic Ocean, creating more opportunities for international trade.

Gibbons v. Ogden  Increased steamboat shipping led to conflict over waterway rights. In 1819 Aaron Ogden sued Thomas Gibbons for operating steamboats in New York waters that Ogden said he owned. Gibbons did not have a license to operate in New York, but argued that his federal license gave him the right to use New York waterways.
In the case of **Gibbons v. Ogden**, which reached the Supreme Court in 1824, Chief Justice John Marshall reinforced the federal government’s authority to regulate trade between the states by ending monopolistic control over waterways in several states. At the same time, it strengthened the idea that national interests should be placed ahead of regional concerns. The ruling freed up waters to even greater trade and competition within the shipping industry.

## American Railroads

What the steamboat did for water travel, the train did for overland travel. Steam-powered trains had first been developed in Great Britain in the early 1800s. However, they did not become popular in the United States until the 1830s. In 1830 **Peter Cooper** built a small but powerful locomotive called the *Tom Thumb*. He raced the locomotive against a horse-drawn railcar.

Eyewitness John Latrobe later described the race, in which *Tom Thumb* had a slow start and fell behind. Latrobe wrote, “The pace increased, the passengers shouted, the engine gained on the horse . . . then the engine passes the horse, and a great hurrah hailed the victory.” Unfortunately for Cooper, victory was spoiled when *Tom Thumb* broke down and lost the race near the end.

Despite the defeat, the contest showed the power and speed of even a small locomotive. Railroad fever soon spread. By 1840 railroad companies had laid about 2,800 miles of tracks—more than existed in all of Europe. French economist Michel Chevalier described Americans as having “a perfect passion for railroads.”

As more railroads were built, engineers and mechanics overcame many tough challenges. Most British railroads, for example, ran on straight tracks across flat ground. In the United States, however, many railroads had to run up and down steep mountains, around tight curves, and over swift rivers. Railroad companies also built the tracks quickly and often with the least expensive materials available. As time went on, engineers and mechanics built heavier, faster, and more powerful steam locomotives.

By 1860 about 30,000 miles of tracks linked almost every major city in the eastern United States. As a result, the economy surged forward. For example, American locomotives hauled more freight than those in any other country. The railroad companies quickly became some of the most powerful businesses in the nation. As the railroad system grew, manufacturers and farmers could send their goods to distant markets.

In addition to their tremendous economic impact, the railroads made a powerful impression on the senses of many passengers and observers. Trains were the fastest form of transportation that most people had ever experienced. While wagons often traveled less than 2 miles per hour, locomotives averaged about 20 miles per hour. Writer George Templeton Strong of New York City described the thrill of a steam train passing by in the night:

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**Reading Check**

Summarize Explain the effects of the *Gibbons v. Ogden* ruling.

The *Tom Thumb* was made famous in a race against a horse-drawn carriage. The locomotive was small, but powerful for its day.
“Whizzing and rattling and panting, with its fiery furnace gleaming in front, its chimney vomiting fiery smoke above, and its long train of cars rushing along behind like the body and tail of a gigantic dragon—... and all darting forward at the rate of twenty miles an hour. Whew!”

—George Templeton Strong, from The Diary of George Templeton Strong

Riding on the early trains was often an adventure, but it could also be quite dangerous. Engineers trying to stay on time sometimes traveled too fast. English citizen Charles Richard Weld was on a railroad car that flew off the tracks. To his amazement, the other passengers did not complain about the accident. Instead, they praised the engineer for trying to keep on schedule!

Passengers accepted such risks because the railroads reduced travel time dramatically. The development of the railroads changed people’s perceptions of distance. What was once considered to be a long distance to travel suddenly became just a short train ride away. Railroads also helped tie communities together. In 1847 Senator Daniel Webster spoke for many people in the United States when he declared that the railroad “towers above all other inventions of this or the preceding age.”

**Transportation Revolution Brings Changes**

The Transportation Revolution brought many changes to America. Steamboats and railroads made getting goods to distant markets much easier and less costly. People in all areas of the nation now had access to products made and grown far away. More than ever before, there was a national economy. The wealth, however, was centered in the North.

Railroads contributed to the expansion of the borders of the nation and guided population growth. Towns sprang up at railroad junctions as people migrated from rural areas. Those towns that did not have railroads nearby suffered and began to decline. Cities grew as trains brought new residents and raw materials for industry and construction. By linking previously isolated cities, towns, and settlements, the railroads promoted trade and interdependence. The growing prosperity of the nation, especially in the North, encouraged Americans to take pride in their country.

**A New Fuel** The Transportation Revolution also increased the use of certain natural resources that had not been important until then. Throughout the early Transportation Revolution, wood was the primary source of fuel for trains and steamboats, as well as for cooking, light, and heat. As faster locomotives were built, new power resources were used to fuel them. Coal replaced wood as the main source of power. A half ton of coal produced as much energy as two tons of wood but at half the cost. Coal also became popular for heating homes. Railroads transported the coal from mines to towns and cities.

As the demand for coal increased, a coal-mining industry developed in many states, including Pennsylvania, western Virginia, and Illinois. Coal mining changed the landscape in a number of ways. New towns, such as
Coal City and Carbondale in Illinois, sprang up in places where coal deposits could be mined. Miners made deep gashes in the earth removing the coal.

Later, in the 1870s, the demand for coal increased as the demand for steel grew. Many steel mills were built where there was an abundance of coal and iron ore. Steel is made through a smelting process—heating iron ore to very high temperatures. Coal was used to fire the furnaces. Steel, which is much stronger than iron, was increasingly used to build factories and the machines they produced.

Cooperation among the steel and railroad industries helped the economy grow. Steel was used to make the rails that trains ride on and the growing market for steel helped fuel the need for more railroads. Railroads transported steel to places where new factories were being built. Railroads also brought new steel farming tools and machines to farmers in the Midwest. Using the new equipment, farmers produced more crops. Railroads then transported their harvests to markets.
Effects of Railroads  The development of railroads helped establish new markets and offered more opportunities for entrepreneurs to start their own businesses. The railroads also played a role in the growth of existing businesses. The logging industry expanded as people in the growing towns and cities needed wood for houses and furniture. As newspaper publishing increased, demand for paper grew. Lumber items became the primary product of New England. Sometimes there were unintended environmental consequences. Settlers spreading out across the Midwest cut down trees and plowed up prairies to make farmland. Deforestation, or cutting down and removing trees, took place on a large scale.

Railroads also caused cities to grow. Some cities became transportation hubs. Chicago was one such city. Its location on Lake Michigan made it an ideal transportation hub, linking the Midwest to the East and South.

Summary and Preview  The Transportation Revolution changed the way business was done. In the next lesson you will learn about more technological advances.

Lesson 3 Assessment

Review Ideas, Terms, and People

1. a. Identify  What forms of transportation were improved or invented at this time?
   b. Analyze  What effect did the Transportation Revolution have on the United States?

2. a. Describe  What were the benefits of steamboat travel?
   b. Analyze  What effect did the ruling in the *Gibbons v. Ogden* case have on federal government?

3. a. Describe  What event showed the power and speed of locomotives?
   b. Draw Conclusions  How did railroads affect trade and business in the United States?
   c. Elaborate  Why do you think Americans were fascinated by railroads?

4. a. Describe  What physical obstacles did railroad construction in the United States face?
   b. Analyze  What effects did the Transportation Revolution have on the U.S. economy?
   c. Identify  What kind of changes did humans make to the environment during the Transportation Revolution?

Critical Thinking

5. Identify Effects  In this lesson you learned about the steamboat and the locomotive. Create a chart similar to the one below and use it to show how they affected business, travel, and communication in the United States.

<table>
<thead>
<tr>
<th>Steamboat</th>
<th>Locomotive</th>
<th>Effects</th>
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More Technological Advances

The Big Idea
Advances in technology led to new inventions that continued to change daily life and work.

Main Ideas
■ The telegraph made swift communication possible from coast to coast.
■ With the shift to steam power, businesses built new factories closer to cities and transportation centers.
■ Improved farm equipment and other labor-saving devices made life easier for many Americans.
■ New inventions changed lives in American homes.

Key Terms and People
Samuel F. B. Morse
telegraph
Morse code
John Deere
Cyrus McCormick
Isaac Singer

If YOU were there . . .
You own a small shop in Chicago, Illinois, in the 1850s. You sell ladies’ hats and gowns. When you need more hats, you send a letter to the manufacturer in New York. Sometimes it takes weeks for the letter to get there. One day, the owner of the shop next door tells you about a wonderful new machine. It can send orders from Chicago to New York in just minutes!

How would a machine like this change your business?

Telegraph Speeds Communication
In 1832 Samuel F. B. Morse perfected the telegraph—a device that could send information over wires across great distances. To develop the telegraph, Morse studied electricity and magnetism. In time, Morse put the work of other scientists together in a practical machine.

The telegraph sent pulses, or surges, of electric current through a wire. The telegraph operator tapped a bar, called a telegraph key, that controlled the length of each pulse. At the other end of the wire, these pulses were changed into clicking sounds. A short click was called a dot. A long click was called a dash. Morse’s partner, Alfred Lewis Vail, developed a system known as Morse code—different combinations of dots and dashes that represent each letter of the alphabet. For example, dot dot dot, dash dash dash, dot dot dot is the distress signal called SOS. Skilled telegraph operators could send and receive many words per minute.

Several years passed before Morse was able to connect two locations with telegraph wires. Despite that achievement, people doubted his machine. Some people did not think that he was reading messages sent from miles away. They claimed that he was making lucky guesses.

Morse’s break came during the 1844 Democratic National Convention in Baltimore, Maryland. A telegraph wired news of the presidential candidate’s nomination to politicians.
in Washington. The waiting politicians responded, “Three cheers for the telegraph!” Telegraphs were soon sending and receiving information for businesses, the government, and newspapers. This new tool helped businesses become more efficient by speeding up their communication. Private citizens also began using the telegraph to communicate socially.

The telegraph grew with the railroad. Telegraph companies strung their wires on poles along railroads across the country. They established telegraph offices in many train stations. Thousands of miles of telegraph line were added every year in the 1850s. The first transcontinental line was finished in 1861. By the time he died in 1872, Morse was famous across the United States.

Steam Power and New Factories

At the start of the Industrial Revolution, most factories ran on water-power. In time, however, factory owners began using steam power. This shift brought major changes to the nation’s industries. Water-powered factories had to be built near streams or waterfalls. In contrast, steam power allowed business owners to build factories almost anywhere. Yet the Northeast was still home to most of the nation’s industries. By 1860 New England alone had as many factories as the entire South did.

Some companies decided to build their factories closer to cities and transportation centers. This provided easier access to workers, allowing businesses to lower wages. Being closer to cities also reduced shipping costs. Cities soon became the center of industrial growth. People from rural areas as well as foreign countries flocked to the cities for factory jobs.

Factory workers improved the designs of many kinds of machines. Mechanics invented tools that could cut and shape metal, stone, and wood with great precision. By the 1840s this new machinery was able to produce interchangeable parts. Within a short period of time, the growing machine-tool industry was even making customized equipment.

**BIOGRAPHY**

**Samuel F. B. Morse 1791–1872**

Like steamboat creator Robert Fulton, Samuel F. B. Morse began his career as a painter rather than as an inventor. In 1832 Morse was a widower struggling to raise his three children alone. He became interested in the idea of sending messages electrically. Morse hoped he could invent a device that would earn him enough money to support his family. Eventually, earnings from the telegraph made Morse extremely wealthy.

**Reading Check**

Identify Cause and Effect

What event led to the widespread use of the telegraph, and what effect did the telegraph have on cross-country communications?

**Draw Conclusions**

What motivated Morse to invent the telegraph?
Improved Farm Equipment

During the 1830s technology began transforming the farm as well as the factory. In 1837 blacksmith John Deere saw that friends in Illinois had difficulty plowing thick soil with iron plows. He thought a steel blade might work better. His design for a steel plow was a success. By 1846 Deere was selling 1,000 plows per year.

In 1831 Cyrus McCormick developed a new harvesting machine, the mechanical reaper, which quickly and efficiently cut down wheat. He began mass-producing his reapers in a Chicago factory. McCormick used new methods to encourage sales. His company advertised, gave demonstrations, and provided a repair and spare parts department. He also let customers buy on credit.

The combination of Deere’s plow and McCormick’s reaper allowed Midwestern farmers to plant and harvest huge crop fields. By 1860 U.S. farmers were producing more than 170 million bushels of wheat and more than 800 million bushels of corn per year.

Improvements in farming technology made farming more efficient, but it also meant fewer laborers were needed to work the land. As a result, many people moved from rural areas to cities to find work.

Changing Life at Home

Many inventions of the Industrial Revolution simply made life easier. When Alexis de Tocqueville of France visited the United States in the early 1830s, he identified what he called a very American quality.

“[Americans want] to be always making life more comfortable and convenient, to avoid trouble, and to satisfy the smallest wants [desires] without effort and almost without cost.”

—Alexis de Tocqueville, from Democracy in America
The sewing machine was one of these conveniences. It was first invented by Elias Howe, a factory apprentice in Lowell, Massachusetts. Isaac Singer then made improvements to Howe's design. Like McCormick, Singer allowed customers to buy his machines on credit and provided a repair service. By 1860 Singer's company was the world's largest maker of sewing machines.

Other advances improved on everyday items. In the 1830s iceboxes cooled by large blocks of ice became available. Iceboxes stored fresh food safely for longer periods. Iron cookstoves began replacing cooking fires and stone hearths.

Companies also began to mass-produce earlier inventions. This allowed many families to buy household items, such as clocks, that they could not afford in the past. For example, a clock that cost $50 in 1800 was selling for only $1.50 by the 1850s. Additional useful items created during this period include matches, introduced in the 1830s, and the safety pin, invented in 1849. All of these inventions helped make life at home more convenient for an increasing number of Americans.

**Summary and Preview** New machines and inventions changed the way Americans lived and did business in the early 1800s. A market economy developed as people began to buy and sell goods rather than making goods for their own use. In the next module you will learn how agricultural changes affected the South.

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**Reading Check**

Analyze How did labor-saving inventions affect daily life?

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**Lesson 4 Assessment**

**Review Ideas, Terms, and People**

1. a. **Describe** How did the telegraph work?  
   b. **Predict** What impact might the telegraph have on the future of the United States?

2. a. **Describe** How did water-powered factories differ from steam-powered factories?  
   b. **Explain** How did the shift to steam power lead to the growth of cities?

3. a. **Identify** What contributions did John Deere and Cyrus McCormick make to farming?  
   b. **Analyze** What effect did new inventions have on agriculture in the United States?

4. a. **Identify** What inventions improved life at home?  
   b. **Evaluate** Which invention do you think had the greatest effect on the daily lives of Americans? Why?

**Critical Thinking**

5. **Support a Point of View** In this lesson you learned about more technological advances and their effects. Create a table like the one below that shows the three advances you think are most important and why.

<table>
<thead>
<tr>
<th>Most Important</th>
<th>Why</th>
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**Define the Skill**

Everyone has *convictions*, or firmly held beliefs. However, when we let our beliefs automatically slant or shape our point of view on topics, we may be showing bias. *Bias* is a fixed idea or opinion about someone or something. Some bias is based on a set of ideas about a group to which the person or thing belongs. This type of bias is called a *stereotype*. If the group is defined by race, religion, age, gender, or similar characteristics, the bias is known as *prejudice*.

Bias, stereotypes, and prejudice are not always negative in nature. They include favorable opinions, too. For example, the belief that a student is good at math because that person is male is a bias that shows both stereotyping and prejudice.

We should always be on guard for the presence of personal bias. Eliminating stereotyping and prejudice is particularly important. However, even “good” biases can slant how we view, judge, and communicate information. Honest and accurate communication requires that the information and ideas we express be as free of bias as possible.

**Learn the Skill**

Not all beliefs are biases, even if those beliefs are strongly held. Biases are beliefs that have little or no evidence to support them. The more unreasonable a person’s view is in light of facts and evidence, the more likely it is that the belief is a bias.

Another characteristic of bias is the person’s reluctance to question his or her belief if it is challenged by evidence. Sometimes people stubbornly cling to views that overwhelming evidence proves wrong. This is why bias is defined as a “fixed” idea or opinion. One of the most damaging effects of bias, and a good reason for trying to avoid it, is that it can prevent us from learning new things.

The following precautions can help you reduce the amount of bias you express.

1. When discussing a topic, keep in mind beliefs and experiences in your own background that might affect how you feel about the topic.
2. Try to not mix statements of fact with statements of opinion. Clearly separate and indicate what you know to be true from what you believe to be true.
3. Avoid using emotional, positive, or negative words when communicating factual information.

**Practice the Skill**

In 1834 Tennessee congressman Davy Crockett visited the textile mills at Lowell, Massachusetts. Read his account of the “Lowell girls” who worked in the factory and complete the activity below.

> “Here are thousands [of young women], useful to others, . . . with the prospect before them of future comfort and respectability. . . . There are more than five thousand females employed in Lowell; and when you come to see the amount of labour performed by them, in superintending [operating] the different machinery, you will be astonished.”

Suppose that you were a “Lowell girl” who has just read this account of Crockett’s visit. Write a letter to the editor of the *Lowell Offering* reacting to the biases and stereotypes about women that Crockett shows in his account.
Review Vocabulary, Terms, and People

Complete each sentence below by filling in the blank with the correct term or person from the module.

1. The system of __________ was developed to represent letters of the alphabet when sending telegraph messages.
2. The first American woman to hold a high-ranking position in the labor movement was __________.
3. The __________ was a period of rapid growth in the use of machines and manufacturing.
4. The first locomotive in the United States was built by __________.
5. Workers would sometimes go on __________ to force factory owners to meet their demands for better pay and working conditions.
6. The __________ industry, which produced cloth items, was the first to use machines for manufacturing.

Comprehension and Critical Thinking

Lesson 1
7. a. **Identify** What ideas did Eli Whitney want to apply to the manufacture of guns?
   b. **Analyze** How did the War of 1812 lead to a boom in manufacturing in the United States?
   c. **Elaborate** Why do you think the Industrial Revolution began in Great Britain rather than in the United States?

Lesson 2
8. a. **Describe** What was mill life like?
   b. **Draw Conclusions** How did the Rhode Island system and the Lowell system change the lives of American workers?
   c. **Evaluate** Were reformers such as Sarah G. Bagley effective in improving labor conditions? Why?

Lesson 3
9. a. **Describe** How were Americans affected by the introduction of steamboats?
   b. **Make Inferences** How did railroad companies become some of the most powerful businesses in the country?
   c. **Elaborate** What was the most important result of the Transportation Revolution? Why?

Lesson 4
10. a. **Recall** What important change took place in how factories were powered?
    b. **Draw Conclusions** How did the telegraph affect communication in the United States?
    c. **Evaluate** Do you think moving factories close to cities helped or hurt working life? Explain.
Module 13 Assessment, continued

Review Themes

11. **Science and Technology** What are the three most important inventions of the Industrial Revolution? Why?

12. **Economics** What was the overall effect of the Industrial Revolution on the U.S. economy?

Reading Skills

**Understand Causes and Effects in History** Use the Reading Skills taught in this module to answer the question about the reading selection below.

Many young women came to Lowell from different parts of New England. They wanted the chance to earn money instead of working on the family farm.

13. According to the passage above, what was a cause for moving to Lowell?
   a. working long hours
   b. earning money
   c. meeting people
   d. working on a farm

Social Studies Skills

**Personal Conviction and Bias** Use the Social Studies Skills taught in this module to answer the question about the reading selection below.

“Is anyone such a fool as to suppose that out of six thousand factory girls in Lowell, sixty would be there if they could help it?”
—Sarah G. Bagley, quoted in *Voice of Industry*, September 18, 1845

14. Do you think that Bagley’s opposition to the Lowell system was unfairly biased? Why or why not?

Focus on Writing

15. **Write a Newspaper Advertisement** Review the inventions discussed in the module. Choose one invention for which you will create an advertisement. Then answer these questions to help you plan your advertisement: Who is your audience? Who will buy this invention? How will the invention benefit this audience? What words or phrases will best persuade this audience? Once you have answered these questions, design your advertisement. To draw readers’ attention to your ad, include an illustration, a catchy heading, and a few lines of text.