4 The Changing Workplace

TERMS & NAMES
- putting-out system
- master
- journeyman
- apprentice
- strike
- National Trades' U

LEARN ABOUT changes in manufacturing and factories
TO UNDERSTAND the problems faced by the emerging industrial workforce.

ONE AMERICAN'S STORY

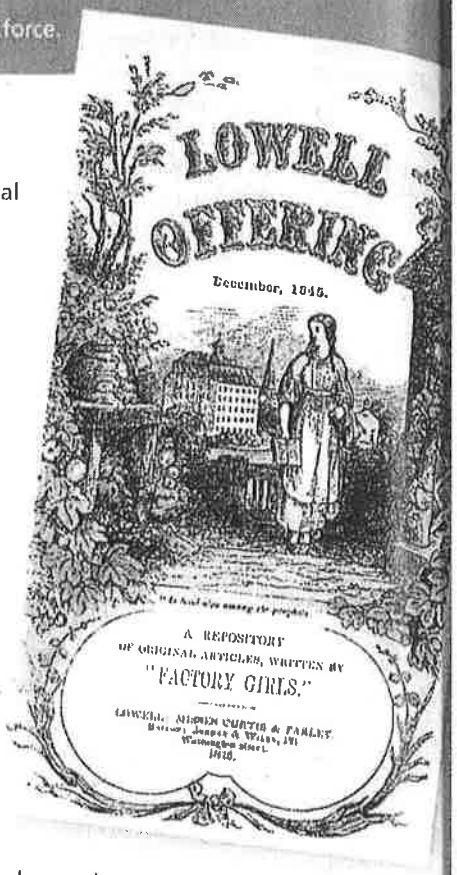
In 1841 a brief narrative appeared in the *Lowell Offering,* the first journal written by and for female mill workers. A young girl who toiled in the mill—identified only by the initials F.G.A.—wrote about the decision of "Susan Miller" to save her family's farm by working in the Lowell, Massachusetts, textile (cloth) mills. Acknowledging the danger of the unfamiliar machinery, the determined girl nevertheless insisted, "If I am careful, I need not fear any injury."

At first, Susan found the factory work "dispiriting," but eventually she came to accept it and to take comfort in the company of the other girls who worked and lived with her in Lowell. Most of all, Susan felt proud of the wages she sent home.

A PERSONAL VOICE

Every morning the bells pealed forth the same clangor, and every night brought the same feeling of fatigue. But Susan felt, as all factory girls feel, that she could bear it for a while. There are few who look upon factory labor as a pursuit for life. It is but a temporary vocation; and most of the girls resolve to quit the Mill when some favorite design is accomplished. Money is their object—not for itself, but for what it can perform; and paydays are the landmarks which cheer all hearts, by assuring them of their progress to the wished-for goal.

F.G.A., *Lowell Offering,* 1841



The *Lowell Offerin* was published fro 1840 to 1845.

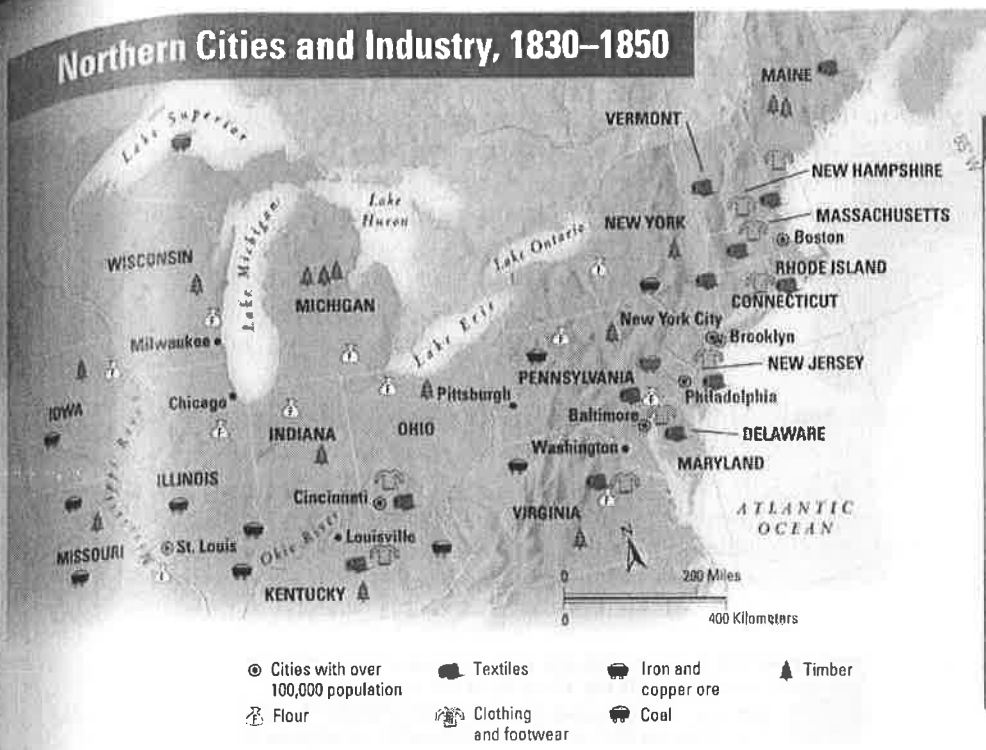
Just a few decades earlier, work outside the home might not have been an option for girls like Susan. At the same time that women's roles began to expand, changes occurred in the way goods were manufactured. The movement of thousands of women from farms to factory work after 1820 signaled an important historical development for many working men and women: the movement of production from the home to the factory.

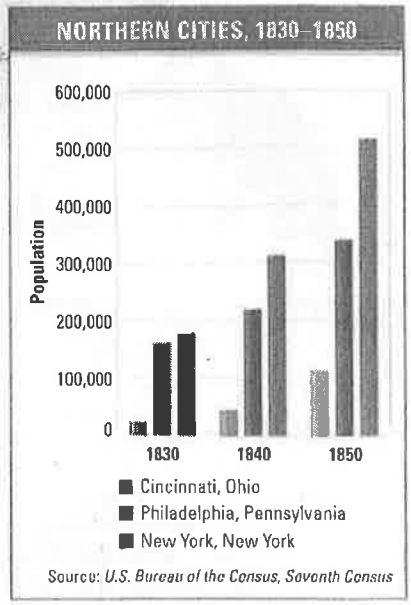
Industry Changes Work

Before "Susan" and other girls began to abandon quiet farms for New England's noisy textile mills, women had spun and sewed most of their families' clothing from raw fibers. In fact, in the early 19th century Americans produced in their own homes almost all of the manufactured items their families needed. Moving production from the home to the factory split families, created new communities, and transformed traditional relationships between employers and employees. The textile industry pioneered the new manufacturing techniques that would alter work disciplines—the rules and behavior required of workers—for most Americans.

RURAL MANUFACTURING Until the second decade of the 19th century, only the first step in the manufacture of clothing—the spinning of cotton into thread—had been successfully mechanized in America. People then finished the work in what was called the **putting-out system,** a system of production in

Northern Cities and Industry, 1830–1850





GEOGRAPHY SKILLBUILDER
REGION *In areas where the textile industry was strong, what other industry was also prominent?*
PLACE *How did the sites of New York City, Philadelphia, and Cincinnati encourage their growth as industrial towns?*

which manufacturers provided the materials for goods to be produced in the home. Though women did most of this work, men and children sometimes helped too. The participants in this cottage industry brought the finished articles to the manufacturer, who paid them by the piece and gave them new materials for the next batch of work.

When Patrick Tracy Jackson, Nathan Appleton, and Francis Cabot Lowell opened their Waltham and Lowell, Massachusetts, weaving factories (see Chapter 7, page 199), their power looms replaced the putting-out system. Mechanizing the entire process and housing all the tools in the same place slashed the production time, as well as the cost, of textile manufacture. By the 1830s, the company that Francis Cabot Lowell and his partners had formed owned eight factories in Massachusetts with over 6,000 employees, at an investment of over $6 million.

EARLY FACTORIES Textiles led the way, but other areas of manufacture also shifted from homes to factories. In the early 19th century, skilled artisans had typically produced items that a family could not make for itself—furniture and tools, for example. Like participants in the putting-out system, the artisans usually worked in shops attached to their own homes. The most experienced, called **masters,** might be assisted by **journeymen,** skilled workers employed by masters, and by **apprentices,** young workers learning their craft. Master artisans and their assistants traditionally crafted their products by hand until the 1820s, when manufacturers began using production processes that depended on the use of interchangeable parts.

The rapid spread of factory production revolutionized industry in the next two decades. The cost of making and repairing household items dramatically dropped. In addition, new machines allowed unskilled workers to perform tasks that once had taken the effort of trained artisans. To do this work, though, the unskilled workers needed to move from their rural homes to factory towns such as Lowell. There they shifted from farm work to boring and repetitive factory work and to the tight restrictions imposed by factory managers. Nowhere were these restrictions more rigid than in the factory town of Lowell, Massachusetts.

THINK THROUGH HISTORY
A. Recognizing Effects *How did factory production change American manufacturing?*

Farm Girl to Factory Worker

Under the strict control of female supervisors, a workforce consisting almost entirely of unmarried farm girls clustered in Lowell and the other mill towns that soon dotted New England. At their boarding houses, the "mill girls" lived under strict curfews. The supervisors closely monitored the girls' behavior and church attendance. Despite this scrutiny, however, many mill girls enjoyed the companionship of their co-workers. Most mill girls also liked earning money. By 1828 women made up nine-tenths of the workforce in the New England mills—and four out of five of the women were not yet 30 years old.

NOW THEN

TELECOMMUTING

Telecommuting, the practice of working at home with modem-linked computers rather than in office buildings, has mushroomed in the United States in the 1990s.

In the mid-19th century, an increasing number of American workers worked in factories rather than in homes and on farms. At the end of the 20th century, however, many Americans were establishing electronic work centers at home. These telecommuters use new technologies—such as cellular phones, laptop computers, and fax machines—to perform jobs that formerly needed to be done in offices. Employers win more productive workers, while telecommuters win flexible working hours and reduced commuting time.

One research firm predicts that in the early 21st century, as many as 14 million employees in fields as diverse as architecture, writing, and radiology will telecommute.

THE LOWELL MILL Mill owners sought female employees because they could pay women wages lower than those of men who did similar jobs. To the girls in the mills, though, textile work offered better pay than their only alternatives: teaching, sewing, and domestic work. In an 1846 letter to her father in New Hampshire, 16-year-old Mary Paul expressed her satisfaction with her situation at Lowell.

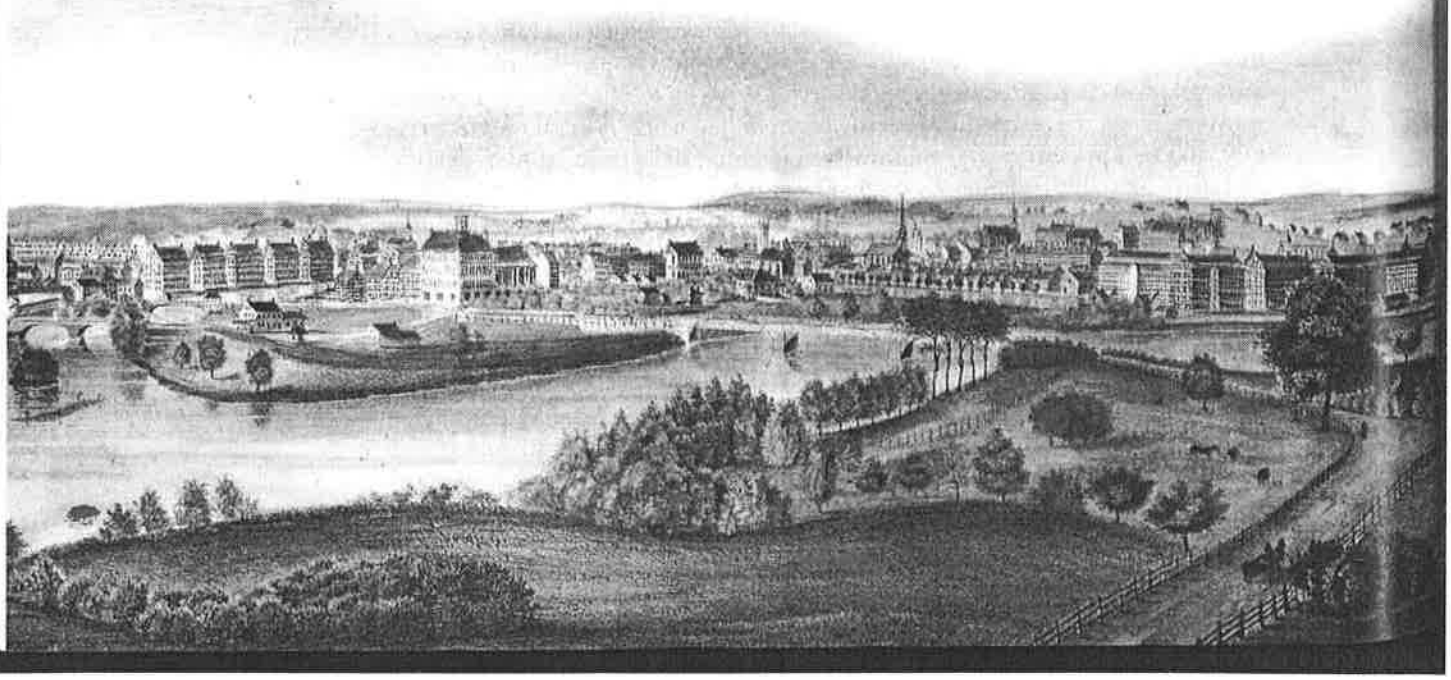
A PERSONAL VOICE

I am at work in a spinning room tending four sides of warp which is one girl's work. The overseer tells me that he never had a girl get along better than I do. . . . I have a very good boarding place, have enough to eat. . . . The girls are all kind and obliging. . . . I think that the factory is the best place for me and if any girl wants employment, I advise them to come to Lowell.

MARY PAUL, quoted in *Women and the American Experience*

Like Mary Paul, who eventually left factory work to become a housewife, most female workers stayed at Lowell for only a few years. Harriet Hanson Robinson, a mill girl who married and became involved in the abolition and women's rights movements, applauded the mill girls' influence in carrying "new fashions, new books, new ideas" back to their homes.

CONDITIONS AT LOWELL The workday at Lowell began at 5 A.M., Mary Paul wrote her father, with a bell ringing "for the folks to get up. At seven they are called to the mill. At half past twelve we have dinner, are called back again at one and stay until half past seven."



This depiction of Lowell, Massachusetts, in 1834 shows the factories along the river banks.

These hours probably didn't seem unduly long to farm girls, but heat, darkness, and poor ventilation in the factories contributed to discomfort and illness. Overseers would nail windows shut to seal in the humidity they thought prevented the threads from breaking, so that in the summer the weaving rooms felt like ovens. In the winter, pungent smoke from whale-oil lamps blended with the cotton dust to make breathing difficult.

Mill conditions deteriorated further in the 1830s. Managers forced workers to increase their pace. Between 1836 and 1850, Lowell owners tripled the number of spindles and looms but hired only 50 percent more workers to operate them. In the mid-1840s one mill manager said, "I regard my workpeople just as I regard my machinery. So long as they can do my work for what I choose to pay them, I keep them, getting out of them all I can."

THINK THROUGH HISTORY
B. *Analyzing Causes* *What factors contributed to the worsening conditions workers endured at Lowell beginning in the 1830s?*

Factory rules tightened too. After gulping a noon meal, workers now had to rush back to the weaving rooms to avoid fines for lateness. In 1834, when the Lowell mills announced a 15 percent wage cut, 800 mill girls organized a **strike**, a work stoppage in order to force an employer to respond to demands.

Mid-19th century "mill girls" often worked 12-hour days, six days a week—but for many, it was their first chance to earn money. These Massachusetts mill workers are holding shuttles, which were used during weaving.

STRIKES AT LOWELL Under the heading "UNION IS POWER," the Lowell strikers of 1834 issued a proclamation declaring that they would not return to work "unless our wages are continued to us as they have been." For its part, the company threatened to recruit local women to fill the strikers' jobs. Criticized by the Lowell press and clergy, most of the strikers agreed to return to work at reduced wages. The mill owners fired the strike leaders.

In 1836, Lowell mill workers struck again, this time over an increase in their board charges that was equivalent to a 12.5 percent pay cut. Twice as many women participated as had two years earlier. Only 11 at the time of the strike, Harriet Hanson Robinson later recalled the protest.

A PERSONAL VOICE
As I looked back at the long line that followed me, I was more proud than I have ever been since at any success I may have achieved, and more proud than I shall ever be again until my own beloved State gives to its women citizens the right of suffrage [voting].
HARRIET HANSON ROBINSON, quoted in *Women's America*

THINK THROUGH HISTORY
C. *Evaluating Decisions* *Based on the results, do you think the decision to strike at Lowell was a good one?*

As in 1834, however, the company prevailed. After firing the strike leaders and dismissing Harriet Hanson Robinson's widowed mother, a boarding-house supervisor, the managers watched as most of the strikers returned to their spindles and looms.

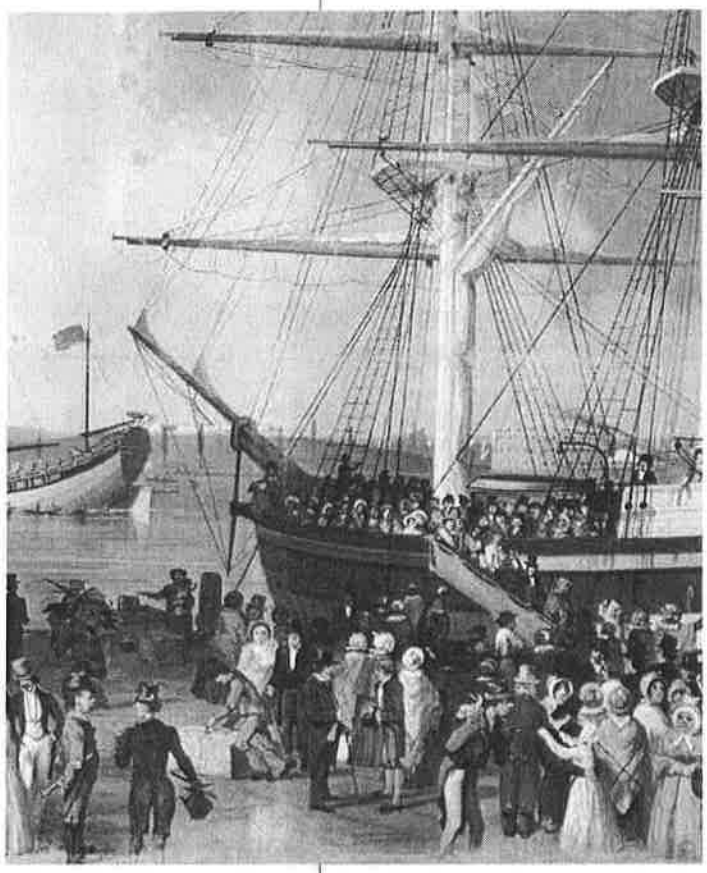
The Lowell workers did not give up their fight for better working conditions after these setbacks. Indeed, in the 1840s, the mill girls took their concerns to the political arena. In 1844, Sarah Bagley founded the Lowell Female Labor Reform Association to petition the Massachusetts state legislature, which had established a committee to consider legislation for a ten-hour work day. The proposed legislation failed, but the Lowell Association was able to help defeat a local legislator who opposed the bill.

"I regard my workpeople just as I regard my machinery."

TEXTILE MILL MANAGER, 1840s

Workers Seek Better Conditions

Female textile workers were not the only laborers seeking better wages and working conditions. As conditions for all workers deteriorated during the 1830s, skilled artisans, who had originally formed unions to preserve their own interests, began to ally themselves with unskilled laborers. When Philadelphia coal workers struck for a 10-hour day in 1835, for example, carpenters, cigar makers, shoemakers, leatherworkers, and other artisans joined them in what became the first general strike in the United States.



The swelling numbers of immigrants arriving at New York harbor in the mid-19th century made common scenes like this one painted by Samuel Waugh in 1847.

Although only 1 or 2 percent of workers in the United States were organized, the 1830s and 1840s saw dozens of strikes—many for higher wages, but some for a shorter workday. Employers won most of these strikes because they could easily replace unskilled workers with strikebreakers who would toil long hours for low wages. Many of these strikebreakers were immigrants who had just escaped even worse poverty in Europe.

IMMIGRATION INCREASES European immigration rose dramatically in the United States between 1830 and 1860. In the decade 1845–1854 alone nearly 3 million immigrants were added to a population that had numbered only about 20 million. While some emigrated from England, Scandinavia, Switzerland, and Holland, most of the immigrants were German or Irish.

Most immigrants avoided the South because slavery limited their economic opportunity and Southerners were generally hostile to European, particularly Catholic, immigrants. The German immigrants clustered in the upper Mississippi Valley and in the Ohio Valley, primarily in Illinois, Ohio, Wisconsin, and Missouri. Most German immigrants had been farmers in Europe, but some became professionals, artisans, and shopkeepers in the United States.

Irish immigrants congregated in the large cities of the East, where they performed whatever work they could find. Nearly a million Irish immigrants had settled in America between 1815 and 1844. Between 1845 and 1854 Irish immigration soared after a blight destroyed the peasants' staple crop, potatoes, which led to a famine in Ireland. The Great Potato Famine killed as many as 1 million of the Irish people and drove about 1.3 million more to new homes in America.

Irish immigrants faced bitter prejudice, both because they were Roman Catholic and because they were poor. Frightened by allegations of a Catholic conspiracy to take over the country, Protestant mobs in New York, Philadelphia, and Boston rampaged through Irish neighborhoods. Native-born artisans, whose wages had fallen because of competition from unskilled laborers and factory production, considered Irish immigrants the most unfair competition of all. Their willingness to work for low wages under terrible conditions made the desperate Irish easy prey for employers who sought to break strikes with cheap labor.

Other Irish immigrants, however, soon began to view unions as an opportunity to advance their prospects. In fact, Irish dockworkers organized New York City's most famous strike of the 1840s. When Irish women tailors organized the

THINK THROUGH HISTORY
D. Recognizing Effects *How did the influx of new immigrants from Germany and Ireland affect circumstances in the workplace?*

Ladies Industrial Association in New York City in 1845, their leader, Elizabeth Gray, denounced "tyrant employers." Though employers retained great power through the 1840s, unions did manage to win a few victories.

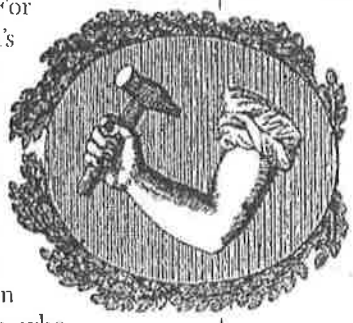
NATIONAL TRADES' UNION In their earliest attempts to organize, journeymen formed trade unions specific to each trade. For example, journeymen shoemakers organized one of the nation's earliest strikes in 1806. During the 1830s, the trade unions in different towns began to join together to establish unions for such trades as carpentry, shoemaking, weaving, printing, and comb making. By means of these unions, the workers sought to standardize wages and conditions throughout each industry.

Journeymen's organizations from several industries united in 1834 to form the **National Trades' Union,** which represented a variety of occupations. The national trade-union movement faced fierce opposition from bankers and owners, who threatened the unions by forming associations of their own. In addition, workers' efforts to organize were at first hampered by court decisions declaring strikes illegal.

In 1842, however, the Massachusetts Supreme Court supported workers' right to strike in the case of *Commonwealth v. Hunt.* In this case, Chief Justice Lemuel Shaw declared that Boston's journeymen bootmakers could act "in such a manner as best to subserve their own interests." A prominent American court finally had upheld the rights of labor. Although by 1860, barely 5,000 workers were members of what would now be called labor unions, far larger numbers of workers, 20,000 or more, participated in strikes for improved working conditions and wages.

Reform in the workplace came in response to changes in the fledgling industrial system in the United States. Indeed, the religious and social reform movements in the nation in the mid-19th century went hand in hand with economic changes that set in place the foundation for the modern American economy. While some Americans poured their efforts into reforming society, others sought new opportunities for economic growth and expansion. As the nation adjusted to the newly emerging market economy, migration west became a popular option.

THINK THROUGH HISTORY
E. *Recognizing Effects* *Why was the national trade-union movement important?*



This "hammer and hand" symbol appeared in *The Union* and was part of an appeal that called workers to a mass protest against "tyrant" managers.

ECONOMIC BACKGROUND

STRIKE!

In 1806 an organized group of journeyman shoemakers made history when they halted their work to oppose the employment of less-skilled workers for parts of the shoemaking process. The result was one of America's first organized labor strikes.

Though a New York court ruled the shoemakers' walkout illegal, the strike provided a model for labor actions during the next 175 years, as skilled workers fought to preserve the wages, autonomy, and status they were losing as industries mechanized.

Section 4 Assessment

1. TERMS & NAMES

Identify:
- putting-out system
- master
- journeyman
- apprentice
- strike
- National Trades' Union

2. RECOGNIZING EFFECTS Create a chart similar to the one shown and complete it by filling in relevant events.

Worsening conditions in factories

Workers' responses:

1.

2.

Add your own ideas about dealing with factory conditions to the list of workers' responses.

3. ANALYZING ISSUES Do you think the positive effects of mechanizing the manufacturing process outweighed the negative effects? Why or why not?

THINK ABOUT
- changes in job opportunities for artisans, women, and unskilled male laborers
- changes in employer-employee relationships
- working conditions in factories
- the cost of manufactured goods

4. FORMING OPINIONS If you were working in a factory during the mid-1800s, would you be a striker or a strikebreaker? Support your choice with reasons.

THINK ABOUT
- how your decision would be affected by whether you were a native-born American or an immigrant
- how your decision would be affected by whether you were an artisan or an unskilled laborer
- the outcome of most strikes during the 1830s and 1840s

1 The Market Revolution

TERMS & NAMES
- specialization
- market revolution
- capitalism
- entrepreneur
- Samuel F. B. Morse
- telegraph
- John Deere
- Cyrus McCormick

LEARN ABOUT innovations in transportation, communication, and manufacturing during the early 19th century

TO UNDERSTAND how markets for products grew rapidly throughout the United States.

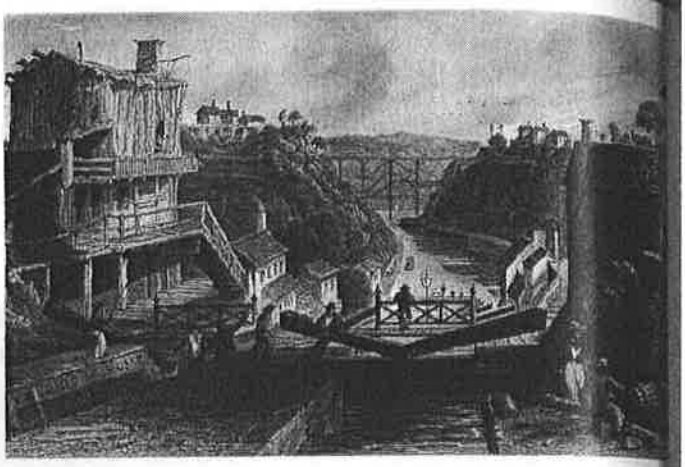
ONE AMERICAN'S STORY

At sunrise on July 4, 1817, a cannon blast from the United States arsenal in Rome, New York, announced the groundbreaking for the Erie Canal. With visiting dignitaries and local residents in attendance, many leaning on shovels to symbolize the digging of the canal, Samuel Young opened the groundbreaking ceremony.

A PERSONAL VOICE

We have assembled here to commence the excavation of the Erie Canal. This work when accomplished will connect our western inland seas with the Atlantic Ocean. . . . By this great highway, unborn millions will easily transport their surplus productions to the shores of the Atlantic, procure their supplies, and hold a useful and profitable intercourse with all the maritime nations of the earth. . . . Let us proceed then to the work, animated by the prospect of its speedy accomplishment, and cheered with the anticipated benedictions of a grateful posterity.

SAMUEL YOUNG, quoted in *Erie Water West*



An Erie Canal lock in Lockport, New York, shown here in an 1838 engraving, was one of 83 locks that helped link the Great Lakes with the northeast.

Although the engineers on the canal project had more eagerness than experience, they successfully supervised a work force that built 83 locks to raise and lower barges. When it was completed, the canal stretched 363 miles from Albany, New York, to Lake Erie.

On November 4, 1825, a fleet of boats traveled to the gala opening celebration in New York City and fulfilled Young's predictions. The lead boat, the *Seneca Chief,* carried whitefish from Lake Erie and flour and butter from Michigan, Ohio, and Buffalo, New York, to the people of New York City. At the celebration, New York's governor, DeWitt Clinton, poured a keg of water from Lake Erie into the Atlantic Ocean as the crowd cheered the "Wedding of the Waters."

As Young implied, the freight of the *Seneca Chief* symbolized the economic importance of the canal. The canal ushered in a new era, in which technology and improved transportation sent new products to markets across the United States.

U.S. Markets Expand

In the early 19th century, rural American workers had produced their own goods or traded with neighbors to supply almost all of their needs. Farm families grew crops and raised animals for food and made their own clothing, candles, and soap. At local markets, family members sold wood, eggs, or butter for cash, which they used to purchase the coffee, tea, sugar, and horseshoes they couldn't produce themselves.

By midcentury, however, the United States had become more industrialized, especially in the Northeast, where the rise of textile mills and the factory system changed the lives of both workers and consumers. Now, workers spent their earnings on goods produced by other workers. Farmers began to shift from self-sufficiency—raising a wide variety of food for their own families—to **specialization,** raising one or two crops that they could sell at home or abroad.

These developments brought about a **market revolution,** in which people bought and sold goods rather than making them for themselves. The market revolution led to a striking change in the U.S. economy and in the daily lives of Americans. Over a few decades, goods and services multiplied while incomes rose. In fact, in the decade of the 1840s, the national economy grew more than it had in the first 40 years of the century.

THE ENTREPRENEURIAL SPIRIT The quickening pace of U.S. economic growth depended on **capitalism,** the economic system in which private businesses and individuals control the means of production—such as factories, machines, and land—and use them to earn profits. For example, in 1813, Francis Cabot Lowell and other Boston merchants had put up $400,000 to form the Boston Manufacturing Company, which produced textiles. Other businessmen supplied their own funds to create capital—the money, property, machines, and factories that fueled America's expanding economy.

These businessmen, called **entrepreneurs** from a French word that means "to undertake," invested their own money in new industries. In doing this, entrepreneurs risked losing their investment if a venture failed, but they also stood to earn huge profits if they succeeded. Alexander Mackay, a Scottish journalist who lived in Canada and traveled in the United States, applauded the entrepreneurs' competitive spirit.

> **A PERSONAL VOICE**
> America is a country in which fortunes have yet to be made. . . . All cannot be made wealthy, but all have a chance of securing a prize. This stimulates to the race, and hence the eagerness of the competition.
>
> **ALEXANDER MACKAY,** quoted in *The Western World*

ECONOMIC BACKGROUND

GOODYEAR AS ENTREPRENEUR

One entrepreneur who developed an industry still vital today was Charles Goodyear (1800–1860). Goodyear took a big risk that paid off for the American public—but left him penniless.

While he was exploring the problem of how to keep rubber elastic and waterproof under extreme temperatures, Goodyear purchased the rights of an inventor who had mixed rubber with sulfur. In 1839, Goodyear discovered that when heated, the mixture toughened into a permanent elastic. In 1844, he received a patent for the process, named vulcanization after Vulcan, the mythological god of fire.

Unfortunately, Goodyear earned only scant monetary reward for his discovery, which others stole and used. The inventor was deep in debt when he died in 1860.

IMPACT ON HOUSEHOLD ECONOMY While entrepreneurial activity boosted America's industrial output, American agriculture continued to flourish. Workers in industrial cities needed food, which they could not produce on their own. To meet this demand for food, American farmers began to use mechanized farm equipment produced in factories. Farmers, therefore, produced important goods for the American industrial machine and became important consumers of manufactured items.

Manufactured items grew less expensive as technological advances lowered prices. For example, a clock that had cost $50 to craft by hand in 1800 could be turned out by machine for half a dollar by midcentury. Falling prices meant that many American workers, on farms as well as in cities, became consumers and purchased new products not only for work, but for comfort as well.

THINK THROUGH HISTORY
A. Recognizing Effects *Describe the impact of the market revolution on potential consumers.*

Singer's foot-treadle sewing machine was patented in 1851 and soon dominated the industry.

Inventions and Improvements

New inventions and technologies, many developed or perfected in the United States, contributed immensely to changes in American life. While some inventions simply made life more enjoyable, others fueled the economic revolution of midcentury and transformed manufacturing, transportation, and communication.

SHOES AND SEWING MACHINES Inventor-entrepreneurs began to develop goods to make life more comfortable for more people. For example, Charles

Goodyear developed vulcanized rubber in 1839. Unlike untreated India rubber, the new product didn't freeze in cold weather or melt in hot weather. Although people first used vulcanized rubber to protect their boots and shoes from snow and mud, the product eventually became indispensable for automobile tires.

A natural place for the growth of industrialization was in producing clothing, a process greatly aided by the invention of the sewing machine. Patented by Elias Howe in 1846, the sewing machine found its first use in shoe factories. Homemakers appreciated I. M. Singer's addition of the foot treadle, which drastically reduced the time it took to sew garments. More importantly, the treadle sewing machine led to the factory production of clothing. When clothing prices tumbled by more than 75 percent, increasing numbers of working people could afford to buy clothes at a store.

KEY PLAYER

SAMUEL F. B. MORSE
1791–1872

While Samuel Morse was a student at Yale University, he learned about the new science of electricity and constructed batteries in a chemistry class. More interested in art than science, however, Morse embarked on a distinguished career in painting. Realizing that he would never support himself as an artist, Morse continued his scientific work.

By the end of 1837, Morse and an associate named Leonard Gale had built an electromagnetic telegraph. Morse's first model could send messages 10 miles on a wire that wound continuously around his workroom.

Congress granted Morse $30,000 in 1843 to build a test line between Baltimore and Washington, D.C. The successful transmission of his coded message won the inventor international fame.

INSTANT COMMUNICATION As new transportation links carried goods and people across vast spaces, new communication links began to put people into instant contact with one another. Improving on a device developed by Joseph Henry, **Samuel F. B. Morse,** a New England artist, created the **telegraph** in 1837. In 1844, Morse tapped out in code the words "What hath God wrought?" The message sped from Washington, D.C., over a metal wire. In less than a second, Morse's words had reached Baltimore, Maryland, prompting an immediate reply. Morse's successful long-distance transmission fulfilled the predictions that Benjamin French, an assistant clerk of the House of Representatives, had made: "[The telegraph] is one of the greatest inventions of the age, and will eventually be laid down all over the Union."

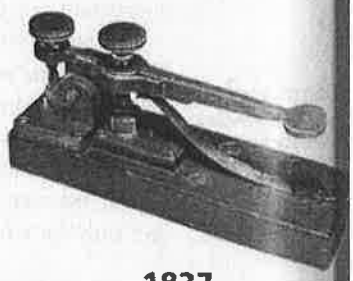
Businessmen used the new communication device to transmit orders and relay up-to-date information on prices and sales. The new railroads employed the telegraph to keep trains moving regularly and to warn engineers of safety hazards. By 1853, 23,000 miles of telegraph wire crossed the country.

THE TRANSPORTATION REVOLUTION Better and faster transportation became essential to the expansion of agriculture and industry. Farmers and manufacturers alike sought more direct ways to ship their goods to market. In 1807, Pennsylvanian Robert Fulton had ushered in the steamboat era when his boat, the *Clermont,* made the 150-mile trip up the Hudson River from New York City to Albany in 32 hours—very fast for the era. Ships that had previously only been able to drift southward down the Mississippi with the current could now turn around to make the return trip because they were powered by steam engines. By 1830, 200 steamboats traveled the nation's western rivers that flowed into the Mississippi and slashed freight rates as well as voyage times.

NOW THEN

From Telegraph to Internet

What do the telegraph and the Internet have in common? They are both tools for instant communication. While the telegraph relied on a network of wires that spanned the country, the Internet—an international network of smaller computer networks—allows any computer user to communicate instantly with any other computer user in the world.



1837
Samuel Morse invents the telegraph, the first instant electronic communicator. Morse taps on a key to send bursts of electricity down a wire to the receiver, where an operator "translates" the coded bursts into understandable language—within seconds after they are sent.

Water transport was particularly important in moving raw materials, such as lead and copper, and heavy machinery. Where waterways didn't exist, Americans excavated them. By 1816, America had dug a mere 100 miles of canals. A quarter of a century later, the country boasted more than 3,300 miles of canals.

The Erie Canal was the nation's first major canal, and it was used heavily. Shipping charges fell to about a tenth of the cost of sending goods over land. Before the first shovel broke ground on the Erie Canal in 1817, for example, freight charges between Buffalo, New York, and New York City averaged 19 cents a ton per mile. By 1830, costs had fallen to less than 2 cents a ton per mile.

The canal's success led to dozens of other canal projects. Farmers in Ohio no longer depended on Mississippi passage to New Orleans. They could now ship their grain via canal and river to New York City, the nation's major port.

1876

Alexander Graham Bell invents the telephone, which relies on a steady stream of electricity, rather than electrical bursts, to transmit sounds. Advances in the telephone have made it possible today to pick up a phone and talk to someone halfway around the world or even in space!

1946

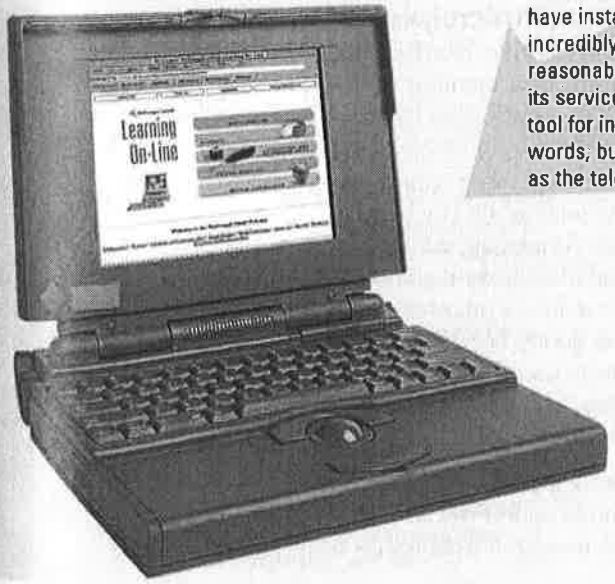
Improvements in electronic communication lead to the development of one of the first computers, at the University of Pennsylvania. The government soon begins using computers for scientific and intelligence work. However, during the Cold War, fear of nuclear war leads to the search for a communication system safe from bombing and not dependent on a central authority.

1964

Scientists come up with the idea of a decentralized computer network that sends messages in small packets from one computer station to another. The Pentagon develops several supercomputer centers that can transfer data from individual computers to other computers on high-speed transmission lines. However, this first and very successful network is soon overworked and outdated. As more universities and individuals join the network, they refine the system and form the complex of networks called the Internet.

1997

Today, on the Internet, through e-mail (electronic mail) or on-line conversation, any two people can have instant dialogue. The Internet is growing incredibly fast, partly because of the relatively reasonable cost of belonging to a network and using its services. The Internet has become the modern tool for instant global communication not only of words, but images, too. And it is just as amazing now as the telegraph was in its time.



INTERACT WITH HISTORY

1. CONTRASTING Based on what you have read, what advantages does the Internet have over the telegraph?

SEE SKILLBUILDER HANDBOOK, PAGE 1041.

2. EXPLORING THE INTERNET On a computer, access the Internet and try to find information about the origin and use of this modern-day communication phenomenon.

For more about using the Internet, visit www.mcdougallittell.com

The canals also opened the heartland of America to world markets by binding the Northeast to the Midwest.

EMERGENCE OF RAILROADS The heyday of the canals lasted only until the 1860s, though, due to the rapid emergence of railroads. Although shipping by rail cost significantly more in the 1840s than did shipping by canal, railroads offered the important advantage of speed. In addition, trains could operate in the winter, and they brought goods to people who did not live near waterways. By the 1840s, steam engines pulled freight at ten miles an hour—more than four times faster than canal boats traveled. Passengers found such speeds exciting also, although early train travel was far from comfortable, as Samuel Breck, a Philadelphia merchant, complained.

> A PERSONAL VOICE
> If one could stop when one wanted, and if one were not locked up in a box with 50 or 60 tobacco-chewers; and the engine and fire did not burn holes in one's clothes . . . and the smell of the smoke, of the oil, and of the chimney did not poison one . . . and [one] were not in danger of being blown sky-high or knocked off the rails—it would be the perfection of travelling.
>
> **SAMUEL BRECK,** quoted in *American Railroads*

THINK THROUGH HISTORY
B. *Recognizing Effects* *How did new products, communication methods, and modes of transportation help the U.S. economy to grow?*

Eventually, railroads grew to be both safe and reliable, and the cost of rail freight gradually came down. By 1850, almost 10,000 miles of track had been laid, and by 1859, railroads carried 2 billion tons of freight a year.

New Markets Link Regions

By the 1840s, improved transportation and communication made America's regions interdependent. Steamboats went up as well as down the Mississippi, linking North to South. The Erie Canal, railroads, and telegraph wires now linked the East and the West. Arteries like the National Road, funded by Congress in 1816, had also opened up western travel. By 1818, the road extended from Cumberland, Maryland, west to Wheeling, Virginia; by 1838, it reached as far west as Vandalia, Illinois.

The growing links between America's regions contributed to the development of regional specialties. The East manufactured textiles and machinery. The West's grain and livestock fed hungry factory workers in eastern cities and in Europe. The South exported its cotton to England as well as to New England.

ON THE WORLD STAGE

BRITAIN'S COTTON IMPORTS

By 1836, the American South, the world's leading producer of cotton, was also the leading supplier of cotton to Great Britain. In all, Great Britain imported three-quarters of its cotton from the South. Cotton directly or indirectly provided work for one in five people in Britain, then the world's leading industrial power.

For its part, Britain relied so heavily on Southern cotton that cotton growers incorrectly assumed that the British would actively support the South during the Civil War. "No power on earth dares to make war upon [cotton]," a South Carolina senator boldly declared in 1858. "Cotton is king."

NORTHEAST SHIPPING AND MANUFACTURING Heavy investment in canals and railroads transformed the Northeast into the center of American commerce. Following the opening of the Erie Canal in 1825, New York City became the central link between American agriculture and European markets. In fact, more cotton was exported through New York than through any other American city.

THINK THROUGH HISTORY
C. *Analyzing Causes* *How did the transportation revolution bind U.S. regions to one another and to the rest of the world?*

The most striking development of the era, however, was the rise in manufacturing. Although most Americans still lived in rural areas and only 14 percent of workers had manufacturing jobs, these workers produced more and better goods at lower prices than had ever been produced before. Many of these goods became affordable for ordinary Americans, and improvements in transportation allowed people to purchase items from distant places. Some products, like farm equipment, helped make people more productive, too.

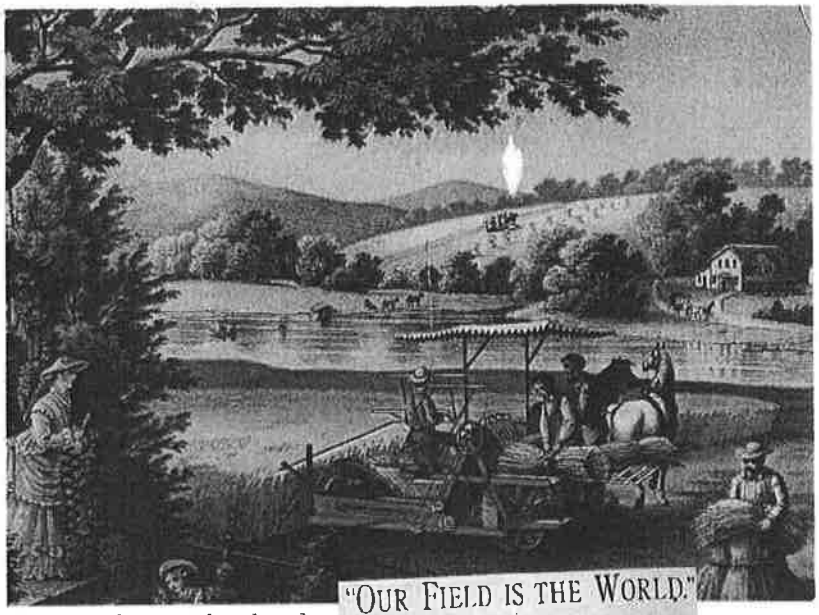
MIDWEST FARMING As the Northeast began to industrialize, many people moved to farm the fertile soil of the Midwest. First, however, they had to work very hard to make the land arable, or fit to cultivate.

Many wooded areas had to be cleared before fields could be planted. Two ingenious inventions allowed farmers to develop the fertile farmland more efficiently and cheaply, and made farming more profitable. In 1837, a blacksmith named **John Deere** invented the steel plow, which enabled farmers to replace their oxen with horses. By the late 1850s, Deere's factory in Moline, Illinois, was selling 13,000 plows each year.

Once harvest time arrived, **Cyrus McCormick's** invention, the mechanical reaper, permitted one farmer to do the work of five hired hands. The reaper was packed in parts and shipped to the farmer, along with a handbook of directions for assembling and operating the machine.

Armed with plows and reapers, ambitious farmers could shift from subsistence farming to growing cash crops, such as wheat and corn. The same trains and canals that brought them plows and reapers from distant factories would then carry their crops to markets in the East.

THINK THROUGH HISTORY
D. *Drawing Conclusions* *Why were the reaper and the steel plow important?*



The McCormick reaper, which first appeared in 1851 at the Crystal Palace Exhibition in London, had an unusual shape, which was described in the London *Times* as "a cross between a flying machine, a wheelbarrow, and an Astly chariot."

SOUTHERN AGRICULTURE While the Northeast embraced commerce and industry, most of the South remained agricultural and relied on such crops as cotton, tobacco, and rice. Southerners who had seen the North's "filthy, overcrowded, licentious factories" looked with disfavor on industrialization. Even if wealthy Southerners wanted to build factories, they usually lacked the capital to do so because they had invested so much in land and the slaves required to plant and harvest the crops.

Though the transportation and communication revolutions were less advanced in the South, these improvements helped keep Americans from every region in touch with one another. Furthermore, they changed the economic relationships between the regions, creating new markets where there had been none. Meanwhile, these changes encouraged Southerners as well as Northerners to seek land and wealth in the seemingly limitless West.

Section 1 Assessment

1. TERMS & NAMES

Identify:
- specialization
- market revolution
- capitalism
- entrepreneur
- Samuel F. B. Morse
- telegraph
- John Deere
- Cyrus McCormick

2. SUMMARIZING Create a time line like the one below, on which you label and date the important innovations in transportation, communication, and manufacturing during the early 19th century.

Write a paragraph explaining which innovation was most important, and why.

3. COMPARING Describe the economies of the different regions of the United States in the mid-1800s. Use details from the section to support your answer.

4. DRAWING CONCLUSIONS During the 1830s and 1840s, transportation and communication linked the country more than ever before. How did these advances affect ordinary Americans?

THINK ABOUT
- the new kinds of transportation
- changes in communications