



Section 1

Standards-Based Instruction



SECTION 1

A New Industrial Revolution



Standards at a Glance

Students learned in Chapter 7 about the earlier Industrial Revolution that transformed the nation in the first few decades of the 1800s. Now they will focus on the changes that the country experienced in the final decades of the late 1800s.

Section Focus Question

What conditions spurred the growth of industry?

Before you begin the lesson for the day, write the Section Focus Question on the board. (*Lesson focus: Government policies helped business grow, new technology allowed railroads and cities to expand, and new sources of energy supplied industry needs.*)

Prepare to Read

Build Background Knowledge

L2

The section deals not only with the early growth of industry but also with some important inventions of the late 1800s. Ask: **What inventions do you consider to be the most important to modern life?** (*Possible answers: lightbulb, telephone, automobile, airplane, computer.*) Have students discuss the changes new inventions can cause. Use the Idea Wave strategy (TE, p. T38) to elicit responses.

Set a Purpose

L2

- Group students into pairs or groups of four. Distribute the Reading Readiness Guide. Ask students to fill in the first two columns of the chart.

All in One Teaching Resources, Unit 6, Reading Readiness Guide, p. 48

- Use the Numbered Heads participation structure (TE, p. T38) to call on students to share one piece of information they already know and one piece of information they want to know. The students will return to these worksheets later.



Standards Preview

H-SS 8.12.1 Trace patterns of agricultural and industrial development as they relate to climate, use of natural resources, markets, and trade and locate such development on a map.

H-SS 8.12.3 Explain how states and the federal government encouraged business expansion through tariffs, banking, land grants, and subsidies.

H-SS 8.12.9 Name the significant inventors and their inventions and identify how they improved the quality of life (e.g., Thomas Edison, Alexander Graham Bell, Orville and Wilbur Wright).

Prepare to Read

Reading Skill

Use Greek Word Origins

English words may be built on several Greek roots, and each of these may be adapted to modern usage. Thus, once you know the roots of a word, you may need to experiment with different ways to shape an up-to-date word. Use the modern context as your final clue to a word's modern English meaning.

E-LA Reading 8.1.2

Vocabulary Builder

High-Use Words

factor, p. 482

alter, p. 487

Key Terms and People

consolidate, p. 483

rebate, p. 483

patent, p. 484

Thomas Edison, p. 484

Alexander Graham Bell, p. 485

Henry Ford, p. 486

assembly line, p. 487

Wilbur and Orville Wright, p. 487

Background Knowledge In Chapter 9, you saw how the Industrial Revolution of the early 1800s changed the way Americans lived and worked. In this section, you will learn how a new Industrial Revolution changed life after the Civil War.

Why Industry Boomed

As the nation expanded westward, conditions were ripe for industrial growth. Vast deposits of coal, iron, lead, and copper now lay within reach of the miner's pickaxe. The towering forests of the Pacific Northwest furnished lumber for building.

Government policy favored industrial growth. Congress gave generous land grants and other subsidies to railroads and other businesses. The government also kept high tariffs on imports. Tariffs helped American industry by making foreign goods more expensive.

Steel and Oil Technology was another **factor** that spurred industrial growth. In the 1850s, inventors developed the Bessemer process, a method to make stronger steel at a low cost. Steel quickly replaced iron as the basic building material of cities and industry.

Pittsburgh became the nation's steel-making capital. Nearby coal mines and good transportation helped Pittsburgh steel mills thrive. Other steel mills sprang up across the Midwest.

Main Idea

Abundant resources, new technology, government aid to business, and a railroad boom all contributed to industrial growth.

Vocabulary Builder

factor (FAK tor) *n.* condition or quality that causes something else to happen

Universal Access

L1 Less Proficient Readers

Seeing Causes and Effects After students read the account of the inventions that helped American industry boom, have them choose one of the following events and make a cause-and-effect chain: the development of the Bessemer process, the

L1 Special Needs

discovery of oil, railroad expansion. The cause-and-effect chain should use information from the section and explain how one discovery or invention led to changes in other areas.

Workers near Titusville, Pennsylvania, tapped a new source of energy in 1859. As they drilled into the ground, a stream of dark liquid gushed upward. It was the nation's first oil strike. The oil industry soon devised methods to refine crude oil into lubricants for machines—and, later, into gasoline to power engines and automobiles. Oil was so valuable it became known as “black gold.”

A Railroad Boom Railroads fueled industrial growth. Trains carried people and goods to the West and raw materials to eastern factories. Companies improved service by adding sleeping and dining cars and laying down thousands of miles of new tracks.

As more lines were built, railroads sought ways to limit competition and keep prices high. Some big lines **consolidated, or combined**. They bought up smaller lines or forced them out of business. The Pennsylvania Railroad, for example, consolidated 73 smaller companies. Railroads also gave secret **rebates, or discounts**, to their best customers. In some places, rival rail lines made agreements to fix rates at a high level.

Such practices helped giant railroads control grain traffic in the West and South. However, high rates angered small farmers, who relied on the railroads to get their goods to market. As a result, many joined the Granger and Populist movements. (See Chapter 13.)

Checkpoint How did the government support business?



Industrial Centers, 1865–1914

MAP MASTER

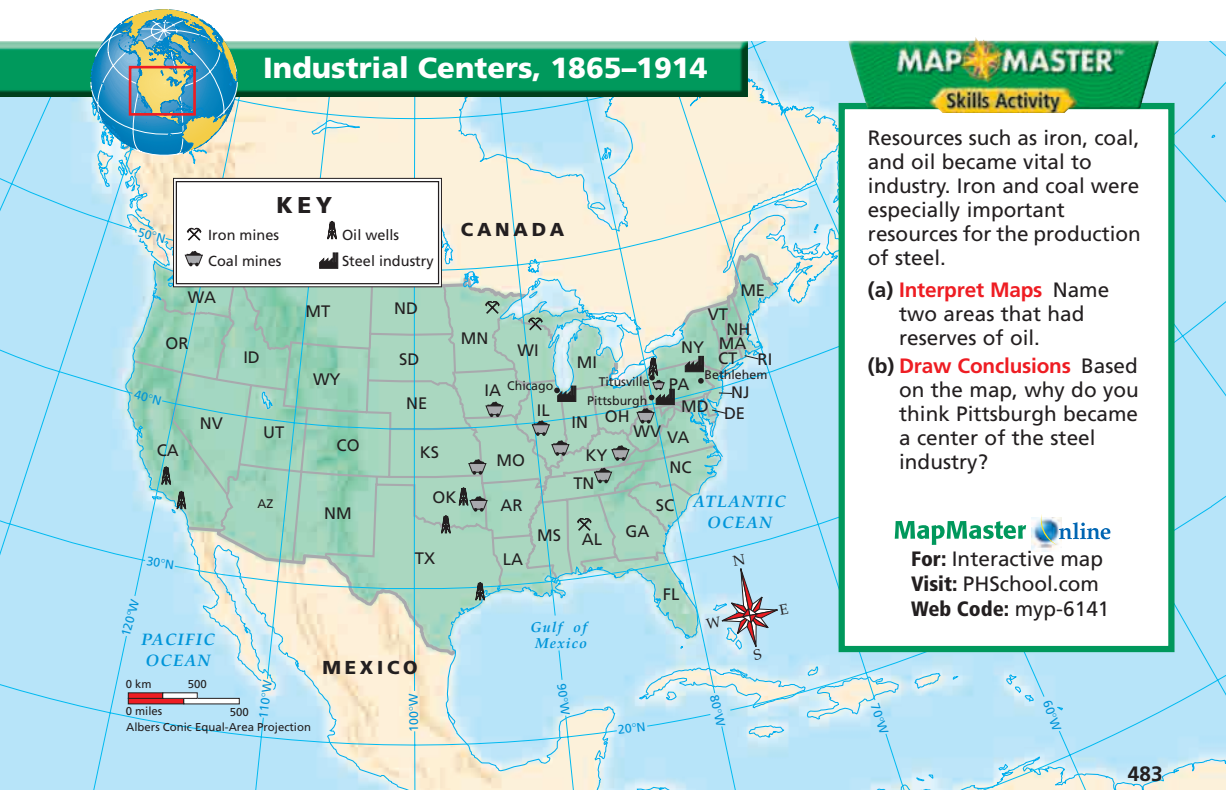
Skills Activity

Resources such as iron, coal, and oil became vital to industry. Iron and coal were especially important resources for the production of steel.

- (a) **Interpret Maps** Name two areas that had reserves of oil.
- (b) **Draw Conclusions** Based on the map, why do you think Pittsburgh became a center of the steel industry?

MapMaster Online

For: Interactive map
Visit: PHSchool.com
Web Code: myp-6141



History Background

Railroad Improvements The Bessemer process and the discovery of oil greatly improved the railroad industry. New rails were put down as fast as possible. In 1860, the United States had 31,000 miles of railroad track. By 1900, it had 193,000 miles.

Ten years after that, the country had one third of all the railroad track in the world. In addition, improved communication through the telegraph helped coordinate the complex network of different rail lines.

Teach

Why Industry Boomed

H-SS 8.12.1, 8.12.3, 8.12.9

Instruction

L2

Vocabulary Builder

High-Use Words Before teaching this section, preteach the High-Use Words **factor** and **alter** using the strategy on TE page 481.

Key Terms Following the instructions on page 7, have students create a See It—Remember It chart for the Key Terms in this chapter.

- Read Why Industry Boomed with students, using the Structured Silent Reading strategy (TE, p. T37).
- Discuss the impact of steel on American industry. Ask: **What technology made steel the main building material of American cities and industry?** (*the Bessemer process that made stronger steel at low cost*)
- Ask: **What was “black gold,” and how did it get that name?** (*“Black gold” is oil. It was extremely valuable.*)
- Ask: **How did big railroads keep prices high?** (*Possible answers: They reduced competition by consolidating and by buying smaller railroads and forcing them out of business.*) Ask: **Do you think these business practices were fair?** (*Students should recognize that business practices that limit competition are inherently unfair.*)

Independent Practice

Have students begin filling in the study guide for this section.

Interactive Reading and Notetaking Study Guide, Chapter 14, Section 1 (Adapted Version also available.)

Monitor Progress

As students fill in the study guide, circulate to make sure individuals understand how new inventions affected industry.

Answers

Checkpoint The government supported business by giving land grants and subsidies to railroads and other businesses and by keeping high tariffs on imported goods.

MAP MASTER Skills Activity (a) Possible answers: Texas, Oklahoma, California, Pennsylvania (b) Possible answer: It was close to coal and oil for fuel.

Inventors and Inventions

H-SS 8.12.9

Instruction

L2

- Have students read *Inventors and Inventions*. Remind them to look for support for the Main Idea.
- Ask: **What was the invention factory, and what did it do?** (*It was Thomas Edison's research laboratory. It gave scientists a place to work on new inventions such as the lightbulb, the phonograph, and the motion picture camera.*)
- Discuss the importance of a reliable source of electricity for the success of inventions such as the lightbulb. Ask students what people needed in order to use lightbulbs and similar inventions. (*access to electricity*)
- Ask students to identify the inventions that were most useful to industry and why. (*Possible answers: Lightbulbs lit up dark factories at night. Telephones improved communication between factories and between buyers and sellers. Typewriters improved business communication.*)
- In order to help students better understand the rapid changes in technology, assign the worksheet *Inventions Change the Nation* and discuss the impact of the inventions.

All in One Teaching Resources, Unit 6, *Inventions Change the Nation*, p. 53

Answer

Evaluate Information Answers will vary, but students should explain why they chose the invention they picked.

America: Land of Inventors

Thomas Edison once said, "Genius is one percent inspiration and ninety-nine percent perspiration." This combination of imagination and hard work enabled Americans to produce a flood of new inventions in the late 1800s. **Critical Thinking: Evaluate Information** Which of the inventions shown here do you think did the most to change daily life? Explain your answer.

Thomas Edison
Electric light bulb, 1879
*Extra daylight for
work and leisure!*



Alexander Graham Bell
Telephone, 1876
*Instant communication
over the miles!*

Main Idea

Thomas Edison and other inventors created hundreds of devices that made life easier.

Inventors and Inventions

In the late 1800s, enterprising Americans created an astonishing flood of new inventions. In fact, the government issued more patents in 1897 alone than in the ten years before the Civil War! A **patent is a document giving someone the sole right to make and sell an invention.**

Around the world, the United States became known as a land of invention. Almost every day, it seemed, American inventions made business and life easier.

Edison's Invention Factory In 1876, **Thomas Edison** set up a research laboratory in Menlo Park, New Jersey. At this "invention factory," Edison and other scientists produced the light bulb, the phonograph, the motion picture camera, and hundreds of other useful devices.

Still, such inventions were worthless without a reliable source of energy. In 1882, Edison opened the nation's first electrical power plant in New York. Other power plants soon sprang up all over the country. They supplied the electricity that lit up homes, powered streetcars, and enabled factories to replace steam engines with safer electric engines. The modern age of electricity had begun.

484 Chapter 14 Industry and Urban Growth

Universal Access

L3 Advanced Readers

L3 Gifted and Talented

Exploring Inventions The list of inventions on these two pages cannot possibly include all the important inventions of that time period. Have students research one of the following inventors: Elijah McCoy, Stephen Dudley Field, Anna Baldwin, Jan

Matzelliger, Charles and J. Frank Duryea, John Thurman, Leo H. Baekeland. Have students summarize the inventor's accomplishments, the dates of key inventions, and the impact of these inventions on America in a brief oral report.

Jan E. Matzeliger

Shoe Lasting Machine No. 27
Patented March 21



29
Black Heritage USA

Jan Matzeliger

Shoe-lasting machine that mechanically shaped the upper portion of shoes, 1883
Cheaper stronger shoes!

History Interactive

Learn More About
Inventors and Inventions

Visit: PHSchool.com
Web Code: myp-6142

The Kodak Camera.



"You press the button, we do the rest!"

(OR YOU CAN DO IT YOURSELF.)
The only camera that anybody can use without instructions. Send for the Primer, free.

The Kodak is for sale by all Photo stock dealers.

The Eastman Dry Plate and Film Co.

Price, \$25.00—Loaded for 100 Pictures. Re-loading, \$2.00. ROCHESTER, N. Y.

George Eastman

Lightweight camera, 1888

*Anyone can be
a photographer!*

A Communications Revolution Improved communication was vital to growing American businesses. The telegraph, in use since 1844, helped people stay in touch with one another. But Americans still had to wait weeks for news from Europe to arrive by boat. In 1866, Cyrus Field had an underwater telegraph cable laid across the Atlantic Ocean that sped communications from Europe.

The telegraph used a code of dots and dashes. **Alexander Graham Bell** wanted to build a device that would carry the human voice. Bell worked for years inventing this device, which he called the telephone. Finally, in 1876, he sent the first telephone message to his assistant in another room: "Mr. Watson, come here. I want you."

Bell's patent for the telephone was the most valuable patent ever issued. By 1885, more than 300,000 phones had been sold, most of them to businesses. Instead of going to a telegraph office, people could buy, sell, and get information about prices or supplies simply by picking up the telephone. In time, Bell organized over 100 local companies into the giant American Telephone and Telegraph Company.

Devices for Home and Office Some inventions made office work faster and cheaper. In 1868, Christopher Sholes invented a letter-writing device called the "Type-Writer." Soon, female typists in offices were churning out letters at 60 words per minute.



Use Greek Word Origins

Phon means "sound" in Greek. *Tele* means "far away." Explain how Greek roots create the meaning we use for telephone.


Instruction (continued)

- Show History Interactive Transparencies Explore American Inventions. Ask: **What new feature of the Kodak camera does this advertisement highlight?** (*how easy it is to use*)

Color Transparencies, Explore American Inventions

Independent Practice

Have students continue filling in the study guide for this section.

 **Interactive Reading and Notetaking Study Guide**, Chapter 14, Section 1
(Adapted Version also available.)

Monitor Progress


As students fill in the study guide, circulate to make sure individuals understand how inventions improved life for Americans. Provide assistance as needed.

History Background

The Telephone Business Alexander Graham Bell's invention of the telephone aroused little interest at first. Scientists praised the invention, but most people saw it as a toy. Bell offered to sell the

telephone to the Western Union Telegraph Company for \$100,000. The company refused—a costly mistake because, in the end, Bell earned millions on the invention.

Answer

 **Reading Skill** Since the Greek word *phon* means "sound" and *tele* means "far away," a telephone transmits sound over a distance.

A Transportation Revolution


 H-SS 8.12.9

Instruction L2

- Have students read A Transportation Revolution. Remind them to look for the sequence of events.
- Ask students to explain why mass production and the assembly line revolutionized transportation. (*Producing many cars at a time was cheaper and easier and made them available to large numbers of people.*)
- Ask: **What did industrial leaders learn from the early automobile industry?** (*Possible answer: to use assembly lines.*)
- Ask: **Why did industry leaders fail to use airplanes when they were first invented?** (*Possible answer: Early planes did not fly far and no one could see a practical use for airplanes.*)

Independent Practice L2

Have students complete the study guide for this section.

 **Interactive Reading and Notetaking Study Guide**, Chapter 14, Section 1 (Adapted Version also available.)


Monitor Progress

- As students fill in the study guide, circulate to make sure individuals understand how transportation inventions changed the nation. Provide assistance as needed.
- Tell students to fill in the last column of the Reading Readiness Guide. Ask them to evaluate whether what they learned was what they had expected to learn.

 **Teaching Resources, Unit 6**, Reading Readiness Guide, p. 49

Answers

Contrast Possible answer: The Wright Brothers' plane was an open biplane; today's planes have single wings and an enclosed area for the pilot and passengers.

 **Checkpoint** It allowed Americans to use new inventions such as the lightbulb.

Links to Science and Technology

The Wright's design included a propeller, a lightweight gas engine, a rudder, and a set of controls that allowed the pilot to move the plane up, down, left and right.

Orville had to lie face down, working the controls with his hands and feet.

The first flight lasted only 12 seconds and flew 120 feet—but the plane landed in one piece!

Human Flight

Until the Wright brothers invented the airplane, people had only flown by wind power, in balloons and gliders. The airplane was revolutionary because it powered itself. In addition, the pilot controlled the movement of the plane. This photograph shows the Wright brothers' first flight on December 17, 1903.

Critical Thinking: Contrast Identify two ways that the Wright brothers' airplane differed from modern airplanes.

Some inventions, such as the camera, affected individuals more than businesses. George Eastman introduced a lightweight camera in 1888. It replaced hundreds of pounds of chemicals and equipment. Because Eastman's camera sold at a low price, ordinary people could record their lives on film.

African Americans contributed to the flood of inventions. Jan Matzeliger revolutionized the shoe industry with a machine that sewed the tops to the soles. Granville Woods devised a way to send telegraph messages between moving trains.

 **Checkpoint** Why was Edison's power plant important?

A Transportation Revolution

Technology also revolutionized transportation. For thousands of years, people had traveled by foot or by horse. Railroads went faster and farther but only where tracks ran.

Then, in the late 1800s, European engineers developed the automobile. Suddenly, people were free to travel almost anywhere and at any time. The automobile ushered in an era of freer and faster transportation.

Henry Ford Only 8,000 Americans owned automobiles in 1900. Then, an American manufacturer, **Henry Ford**, made the automobile available to millions. Ford perfected a system to mass-produce cars and make them available at a lower price.

Main Idea

The automobile and the airplane launched an age of fast transportation.

Universal Access

L1 English Language Learners **L1** Less Proficient Readers

Making Flashcards Have students make a list of the Key Terms and High-Use Words for this chapter. Then have them create flashcards with the word on one side and its definition on the other. Pair students

with a partner, and have them quiz each other on the definitions of the words using the flashcards. Check their understanding as they continue to read the section.

To speed construction and lower costs, Ford introduced the assembly line in 1913. The **assembly line** is a manufacturing method in which a product is put together as it moves along a belt. As each car frame moved along the belt, one set of workers hooked up the engine, another attached the wheels, and so on. The assembly line sliced production time in half. Lower costs allowed Ford to charge lower prices. By 1917, more than 4.5 million Americans owned cars.

Cars changed the nation's landscape. A web of roads spread across the country. Cities began sprawling into the countryside.

The Wright Brothers Another transportation revolution took place in 1903. **Wilbur and Orville Wright** tested a gas-powered airplane at Kitty Hawk, North Carolina. On its first flight, the plane stayed in the air for 12 seconds and flew 120 feet. Orville made four flights that day. His longest flight lasted 59 seconds.

Surprisingly, the first flights did not attract much interest. No one could see any practical use for a flying machine. The military uses of the airplane did not become clear until World War I (1914–1918). By the 1920s, the airplane had begun to **alter** the world by making travel quicker and trade easier.

Checkpoint Why did the cost of automobiles decrease?

Looking Back and Ahead Resources and technology set the stage for growth. In the next section, you will see how business leaders built on this foundation to create giant industries.

Vocabulary Builder
alter (AWL ter) v. to change

Assess and Reteach

Assess Progress L2

Have students complete Check Your Progress. Administer the Section Quiz.

Teaching Resources, Section Quiz, p. 62

To further assess student understanding, use the Progress Monitoring Transparency.

Progress Monitoring Transparencies, Chapter 14, Section 1

Reteach L1

If students need more instruction, have them read this section in the Interactive Reading and Notetaking Study Guide.

Interactive Reading and Notetaking Study Guide, Chapter 14, Section 1 (Adapted Version also available.)

Extend L3

To help students expand their understanding of the new inventions in this time period, have them complete the History Interactive online activity on inventors.

Extend Online
For: History Interactive
Visit: PHSchool.com
Web Code: Myp-6142

Writing Rubrics Share this rubric with the students.

Score 1 All statements are misidentified, no explanations are given.
Score 2 At least one statement is correctly identified, but the explanations are unclear.
Score 3 Most statements are correctly identified, reasonable explanations given.
Score 4 All statements correctly identified, explanations are insightful.

Answer

Checkpoint The assembly line made producing cars less expensive.

- possible to manufacture goods more quickly and cheaply.
7. (a) Yes, manufacturing requires energy and natural resources.
(b) No, secret rebates are unfair because they limit competition.
(c) Yes, it is unfair when customers are not treated equally.
(d) No, inventions help industry become more efficient.

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Section 1 | Check Your Progress



Standards Review

H-SS: 8.12.1, 8.12.3, 8.12.9; E-LA: Reading 8.1.2

Progress Monitoring

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Comprehension and Critical Thinking

- (a) **Identify** What factors were in place at the end of the Civil War that helped create a surge in industrial growth?
(b) **Analyze Cause and Effect** What effect did the discovery of new energy sources have on the Industrial Revolution?
- (a) **List** What inventions revolutionized American life in the late 1800s?
(b) **Make Predictions** What impact did Ford's assembly line have on changing American lifestyles?

Reading Skill

- Use Greek Word Origins** The Greek root *graph* means "writing," and the Greek root *phon* means "sound." The name of what Edison invention combines these roots?

Vocabulary Builder

Answer the following questions in complete sentences that show your understanding of the key terms.

- Why did large rail companies **consolidate**?
- How does a **patent** protect inventors?
- How did the **assembly line** revolutionize factories?

Writing

- Which of the following statements are logical, and which are not logical? Explain why.
Statements:
(a) Abundant natural resources aid economic growth because they provide energy and raw materials for manufacturing.
(b) Secret rebates are unfair because they encourage business but not education or the arts.
(c) Secret rebates are unfair because they were given to some customers but not to others.
(d) Inventions aid industrial growth because they show Americans' special ingenuity.

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Section 1 Check Your Progress

- (a) The expanding nation had more natural resources; there were new inventions; the government favored industrial growth.
(b) They made factories and engines cheaper.
- (a) Possible answers: lightbulb, camera, telephone, phonograph, motion picture camera, typewriter.
(b) People could travel longer distances regularly because cars were affordable.
- Use Greek Word Origins** Since *graph* means "writing," *phonograph* means "a machine that reproduces sounds written onto a disk."
- Large rail companies consolidated to limit competition and keep prices high.
- A patent gives the inventor the sole right to make and sell an invention.
- The assembly line was a conveyor belt that allowed for quicker production and revolutionized factories by making it