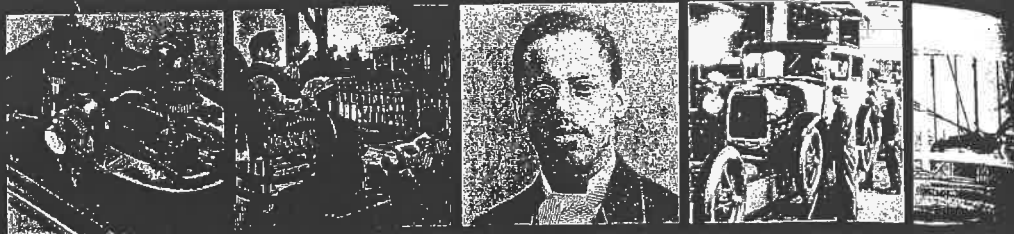


networks

There's More Online!

- GAME
- GRAPHIC ORGANIZER
Effects of Major Inventions
- SLIDE SHOW
Accomplishments in Aviation
- VIDEO



Lesson 2

Inventions Change Society

SENTIAL QUESTION *How does technology change the way people live and work?*

IT MATTERS BECAUSE

New technologies began a transformation of society that has helped shape the world we live in today.

Technology Changes Communications

GUIDING QUESTION *How did innovations in communications change society?*

By 1910 Americans in cities drove cars through streets lit with electric lights. They went to department stores where they could buy everything from shoes to kitchen sinks. Americans also could do their shopping by mail—or pick up the telephone and order groceries from the local store.

Inventors built the first automobile and telephone in the late 1800s. Within a few decades, these inventions had become part of everyday life. They helped people and ideas move quickly over long distances. In the process, they also helped unify the country and promote economic growth.

Morse's Telegraph and Code

During the 1830s, Samuel Morse developed the telegraph. He got help from Congress to build the nation's first telegraph line. In 1844 Morse sent the first telegram—from Baltimore to Washington, D.C. By 1860 the United States had thousands of miles of telegraph lines. Western Union Telegraph Company's trained operators **transmitted** messages in Morse code.

Taking Notes: Identifying

As you read, create a chart like this one to identify the effects of major inventions.

Invention	Effects
Telegraph	
Telephone	
Electric lightbulb	

Content Vocabulary

- Model T
- assembly line
- mass production

Telegrams—messages sent by telegraph—offered almost instant communication over long distances. This was a huge improvement over written communications delivered by hand. Even with trains, a letter could take days to travel from one part of the country to the other.

Telegrams served many purposes. Shopkeepers relied on them to order goods. Reporters used them to send stories to their newspapers. Ordinary people also used telegrams to send personal messages to friends and family.

The telegraph soon linked the United States and Europe. Before the telegraph, news crossed the ocean by ship. This process could take weeks. Cyrus Field wanted to speed it up. After several unsuccessful attempts, Field managed to lay a telegraph cable across the Atlantic Ocean in 1866. The new transatlantic telegraph transmitted messages in a matter of seconds.

Bell and the Telephone

Alexander Graham Bell invented a device that had an even greater impact on communications. Born and educated in Scotland, Bell moved to the United States as a young man. Here he studied methods for teaching people with hearing impairments how to speak. He also experimented with sending the sound of a voice over electrical wires.

By 1876 Bell made great advances in developing a device for transmitting speech—the telephone. While preparing to test the device, he accidentally spilled battery acid on his clothes. Panicked, Bell called out to his assistant, Thomas Watson, who was in another room: “Mr. Watson—come here—I want to see you!” Watson heard Bell’s voice through the telephone. The invention worked.

Bell formed the Bell Telephone Company in 1877. By the 1890s, he had sold hundreds of thousands of phones. Businesses were the first customers to use the new technology. Before long, though, people began to bring this new communication device into their homes.

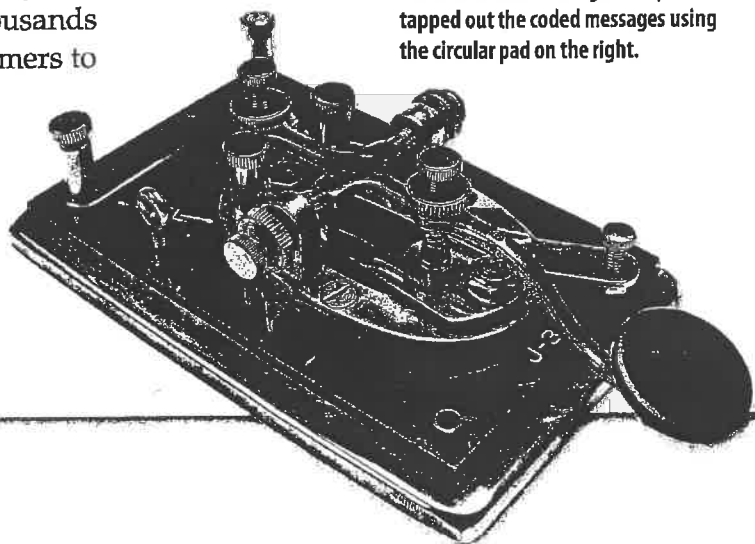
PROGRESS CHECK

Contrasting Describe the difference between a telegraph and a telephone.

Academic Vocabulary

transmit to send a message by electronic signal; to pass from one person or place to another

Telegraph operators used machines like this to send messages. They tapped out the coded messages using the circular pad on the right.



The Genius of Invention

GUIDING QUESTION *How did new inventions improve people's lives?*

The late 1800s saw a burst of inventiveness in the United States. Between 1860 and 1890, the government granted more than 400,000 patents for new inventions. A patent is a license issued by the government that gives someone the right to make, use, and sell an invention without others copying it.

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

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

The Wizard of Menlo Park

In his childhood, Thomas Edison was called “dull” by his teachers. Because of his poor hearing, he had trouble in school and often did not attend. His mother finally removed him from school and taught him at home. Edison loved anything related to science, and his mother allowed him to set up a chemistry lab in the family's basement.

While still in his 20s, Edison decided to go into the “invention business.” In 1876 he set up a workshop in Menlo Park, New Jersey. In the following years, his famous laboratory produced the **phonograph**, the motion picture projector, and the storage battery. Edison's most important invention by far, though, was the lightbulb.

Edison developed the first workable lightbulb in 1879. He then designed power plants that could produce electric power and send it over a wide area. In 1880 Edison used 40 bulbs to light up Menlo Park. Visitors flocked to see the “light of the future.” Then, in 1882, Edison built the first central electric power plant in New York City. It provided electric light to 85 buildings.

Inventor George Westinghouse took Edison's work with electricity even further. In 1885 Westinghouse developed and built transformers, which could send electric power more



In the late 1800s, companies such as Montgomery Ward and Sears sold a wide range of goods—from shoes to farm equipment—through mail-order catalogs.

► CRITICAL THINKING

Analyzing Visuals What does this catalog cover suggest about the appeal of shopping by mail?

Reading **HELP**DESK

Build Vocabulary: *Word Origins*

The word *phonograph* comes from the Greek words *phono-*, which means “sound” and *graphos*, which means “writing.”

556 *The Industrial Age*

Visual Vocabulary

phonograph a device for reproducing sounds by means of using a needle that follows grooves made on cylinders, such as the ones here, or on a disc



cheaply over longer distances. Electricity became the power source for factories, trolleys, streetlights, and lamps throughout the United States. Westinghouse also created a method for safely transporting natural gas and invented many other safety devices.

African American Inventors

A number of African Americans contributed to the era of invention. Engineer Lewis Howard Latimer developed an improved wire for use in the lightbulb. He joined Thomas Edison's company. Granville Woods was an electrical and mechanical engineer from Ohio. He patented dozens of inventions. Among them were an electric incubator and an improved brake for railroads. Elijah McCoy invented a **mechanism** for oiling machinery. Jan E. Matzeliger developed a shoe-making machine. It performed many steps that had been done by hand and revolutionized the shoe industry.

PROGRESS CHECK

Evaluating Which of Edison's inventions do you think is the most valuable to our world today?

A Changing Society

GUIDING QUESTION *How did the inventions of the late 1800s change society?*

In the 1900s, improvements produced a whole new era of transportation. At the heart of this revolution was the automobile, which became a practical machine for moving people and goods from place to place.

Henry Ford's Vision

Henry Ford worked as an engineer in Detroit, Michigan, in the 1890s. He had an interest in automobiles—and a vision. Other people were building cars, but few people could afford them. Ford wanted to build an inexpensive car that would last a lifetime. He experimented with an engine powered by gasoline. In 1903 he started his own auto-making company in Detroit.

In 1906 Ford told Charles Sorenson, one of his workers, "We're going to get a car now that we can make in great volume and get the prices way down." For the next year, Ford and Sorenson worked on the **Model T**, building the car and testing it on rough roads.

Model T early Ford car

Academic Vocabulary

mechanism a set of moving or working parts in a machine or other device

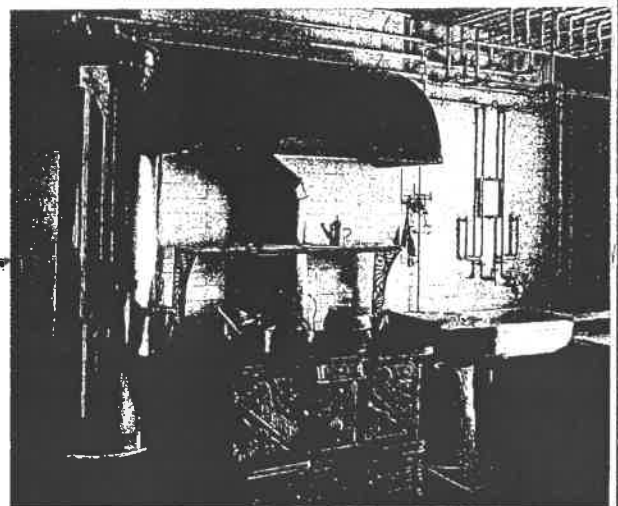


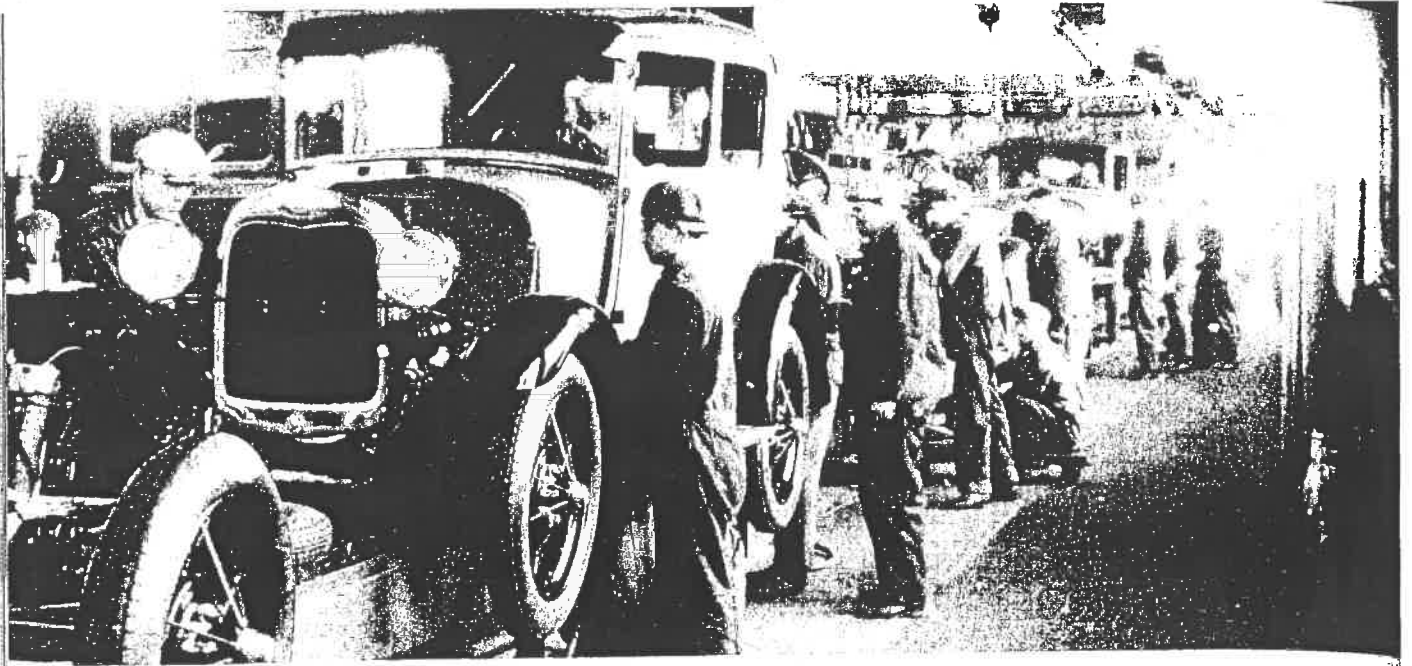
Lewis Latimer invented many useful devices, including an improved version of the lightbulb that lasted much longer than Edison's original.

Westinghouse appliances in homes today are made by a company that George Westinghouse founded in 1886 to develop and produce devices powered by electricity. His biggest competitor was General Electric, the company founded in 1890 by his rival, Thomas Edison.

▶ CRITICAL THINKING

Assessing How is the work of Edison and Westinghouse still affecting us today?





This assembly line at a Ford factory lowered the cost of manufacturing automobiles.

► **CRITICAL THINKING**

Speculating How do you think the development of the assembly line affected workers?

In 1908 Ford introduced the Model T to the public. Sorenson described the sturdy black vehicle as “a car which anyone could afford to buy, which anyone could drive anywhere, and which almost anyone could keep in repair.” These qualities made the Model T very popular. During the next 18 years, Ford’s company sold more than 15 million Model Ts in the United States. It also sold more than a million cars overseas. Model T sales accounted for about half of the automobiles on the road in the world during that time.

Henry Ford also pioneered a new, less expensive way to manufacture cars—the **assembly line**. On the assembly line, each worker performed an assigned task again and again. This method proved more efficient than having one person do several different tasks while building an automobile. The assembly line revolutionized other industries as well. It enabled manufacturers of many different items to produce large quantities of goods more quickly. This **mass production** (pruh • DUHK • shuhn) of goods decreased manufacturing costs, so products could be sold more cheaply.

The First Airplane

Inventors began experimenting with powered flight in the early 1890s. In 1896 American astronomer Samuel Langley built a model airplane that was powered by a steam engine. Langley’s model flew almost a mile before it ran out of fuel and crashed.

assembly line factory method in which work moves past stationary workers who perform a single task

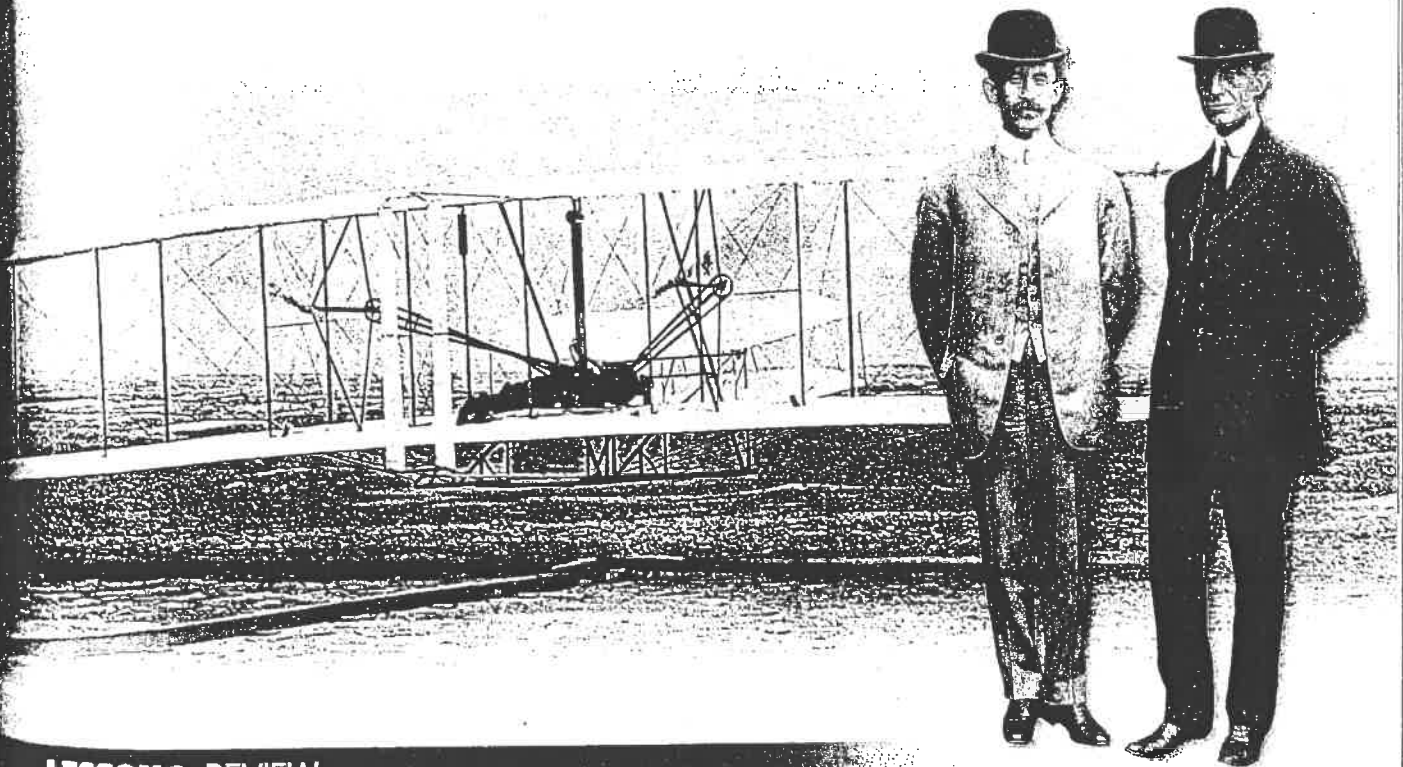
mass production factory production of goods in large quantities

Owners of a bicycle shop, Wilbur and Orville Wright used their skills as mechanics to pioneer human flight. Between 1900 and 1902, they built and tested a series of non-powered gliders. They then designed a plane powered by a gasoline engine. In September 1903, the brothers began testing this new plane at Kitty Hawk, North Carolina. Seven weeks of trial and error at last produced success. On December 17, 1903, the brothers each piloted their plane. Of the four flights that day, the last was most successful. Although Wilbur stayed in the air for just under a minute, longer flights were soon to come. The airplane was born—though it would take some years for this invention to have its full effect on the American way of life.

PROGRESS CHECK

Identifying What was Henry Ford's vision?

The longest of the Wright Brothers' first flights covered 852 feet (260 m) and lasted 59 seconds.



LESSON 2 REVIEW

Review Vocabulary

1. Examine the terms below. Then write a sentence explaining what they have in common.
 - a. mass production
 - b. assembly line
 - c. Model T

Answer the Guiding Questions

2. **Explaining** How did the invention of the telegraph and telephone affect communication?

3. **Determining Cause and Effect** How did new inventions change people's daily lives?

4. **Making Generalizations** How did the inventions of the late 1800s change the nation?

5. **PERSUASIVE WRITING** Which of the inventions discussed in this lesson do you think has had the greatest effect on our way of life today? Write a paragraph defending your choice.