

Biography

Alexander Graham Bell



by Laurie Rozakis

Read to Find Out

Alexander Graham Bell was always fascinated by sound. How did this lead to the invention of the telephone?

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STRATEGIES & SKILLS AT A GLANCE Comprehension

- Strategy: Generate Questions
- Skill: Identify Problem and Solution

Vocabulary

- convinced, dizzy, handy, hilarious, independence, mischief, nowadays, whirlwind

Vocabulary Strategy

- Dictionary: Idioms

CONTENT-AREA VOCABULARY

Words related to inventions

(see *glossary*)

NATIONAL CONTENT STANDARDS

Science

- Science as Inquiry
- History and Nature of Science

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**The total word count is based on words in the running text and headings only. Numerals and words in captions, labels, diagrams, charts, and sidebars are not included.

Alexander Graham Bell

by Laurie Rozakis



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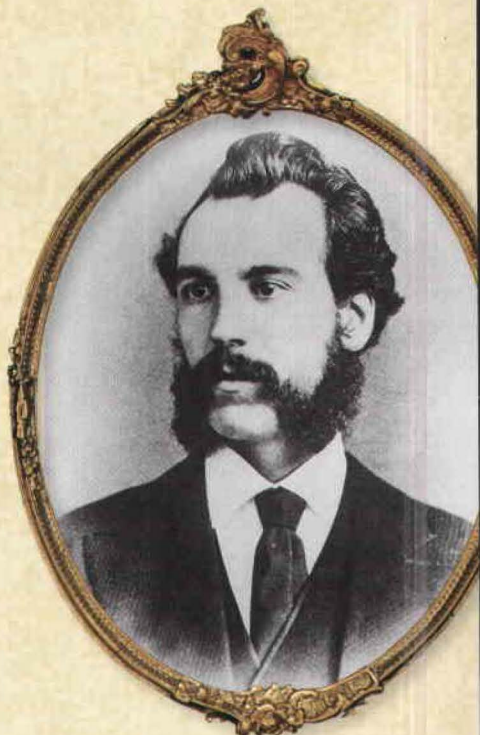
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Introduction

It is Friday afternoon on March 10, 1876. A tall young man stands over a wooden table in his **laboratory**. His name is Alexander Graham Bell.

The table is covered with wire, bottles, and batteries. Bell knows that all of this material will come in handy. He is an **inventor**. Right now, he is working on the most important invention of his life. If it works, it will change the world.

A metal tube hangs over the table. It is connected to a long wire. The wire stretches across the table, under the closed door, and down the hall. The other end of the wire is attached to a **receiver**.

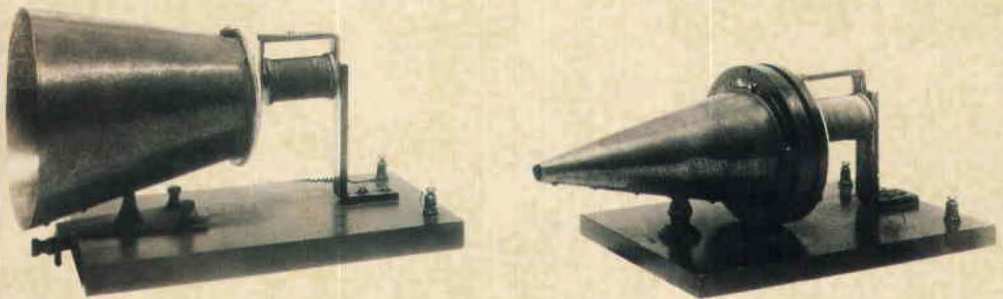


📍 Alexander Graham Bell in 1876.

Thomas A. Watson, Bell's assistant, sits in a room down the hall. He picks up the receiver. He puts it to his ear and stands. He is almost dizzy with excitement.

Bell calls into the open end of the metal tube. "Mr. Watson, come here. I want to see you," he says.

The object on the table is the world's first telephone. Alexander Graham Bell invented it. Now he is testing it for the first time. Will it work?



Once Bell successfully showed that his telephone worked, he kept improving the design. This is one of Bell's earliest telephones. One person spoke into the wide end of the transmitter on the left; the sound came through the receiver on the right.

Chapter 1

Growing Up with Science

Scotland in the 1800s was an exciting place. **Scientists** were making many discoveries. There was a whirlwind of inventing going on. New gas lamps lit the streets. Railroads carried people and supplies across the country. The **telegraph** could send messages with great speed.

Alexander Bell was born in Edinburgh, Scotland, on March 3, 1847. Sound shaped his whole life. His mother Eliza was **hearing impaired**. His father and his grandfather studied speech. They taught people how to speak clearly in public. They helped people overcome speech problems.

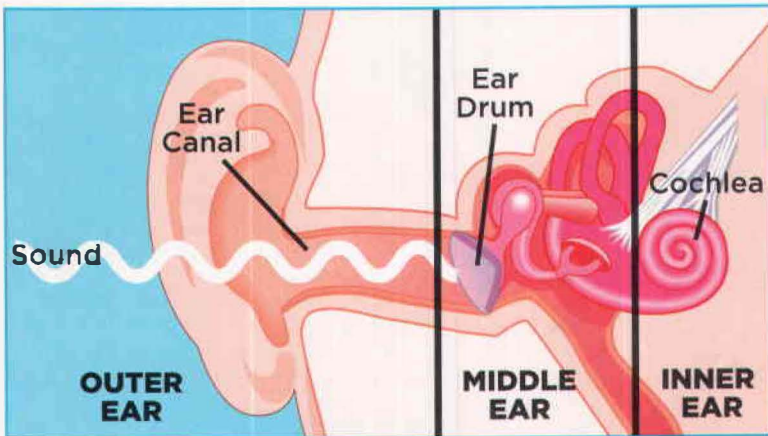
What's in a Name?

Both of Bell's brothers had middle names. But Bell didn't. He decided he wanted one too. One day a family friend named Alexander Graham came for a visit. Bell liked the man's name and added it to his own. That's how he became Alexander Graham Bell.

Bell's mother taught Alexander and his two brothers at home. When Bell was 11 years old, his parents sent him to Royal Edinburgh High School. He did not like school and left after four years without graduating.



Alexander Graham Bell ↻ was 16 years old when he sat for this portrait.



People who are born hearing impaired have a hard time learning to speak because they cannot hear sounds.

Bell had not worked hard at his schoolwork. Instead he asked lots of questions and explored the countryside. He did not get into mischief or make trouble, however. In fact Bell's childhood was perfect for an inventor! But Bell wanted his independence from his family. So Bell's father sent him to London to stay with his grandfather.

🕒 This family portrait shows an adult Bell (back row, second from left) posing with his grandfather Alexander Melville Bell (back row, fourth from left).





📍 In the middle 1800s, London was a big industrial city.

London made a big difference in Bell's life. Bell later said that his time in London was "the turning point in my whole career." He read a lot, went to plays, and learned to study hard. As a result he matured and gained confidence.

The "Talking" Dog

Bell found a way to make the family dog speak by moving its mouth and throat with his hands. He made the dog say something that sounded like "How are you, grandmother?" He and his brothers thought this was hilarious.

Bell returned to Scotland sure that he wanted to be an inventor. He wanted to work with speech and sound. He and his brothers spent a lot of time working on inventions.

Bell's father had invented a written code called "Visible Speech" to help hearing-impaired people learn to speak. Bell and his brothers began helping their father demonstrate how Visible Speech worked. In 1863 they built a speaking machine. Bell had started to invent instruments for human communication.

Bell read about a scientist who made sounds with a tuning fork and **electricity**. Bell thought this meant that the scientist sent words through a wire. Because of this mistake, Bell started trying to send sounds by using electricity. These ideas started Bell's work on the telephone.

Good Vibrations

A tuning fork is a metal tool that has two prongs. When someone strikes a tuning fork, it vibrates and produces a sound.





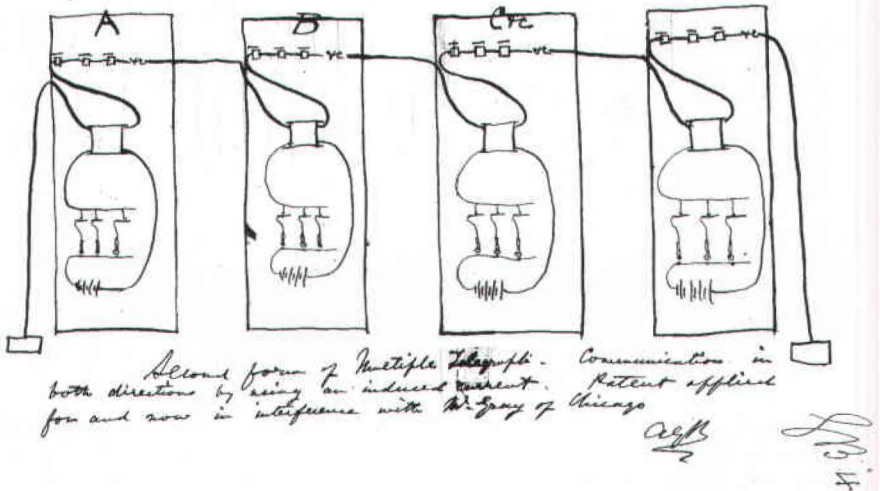
📍 This 1871 photograph shows Bell (top row, far right) with the staff and students of the Pemberton Avenue School for the Deaf in Boston, Massachusetts.

Sadly, both of Bell's brothers died. The family then moved to Canada. Only a year or two later, Bell moved again, this time to Boston. There he taught speech to hearing impaired children. At night he worked on his experiments. In 1872 Bell became a professor of speech at Boston University. While there he spoke to many scientists about his ideas. He met businessmen who helped pay for his electricity and sound experiments.

Chapter 2

First Experiments

Alexander Graham Bell worked to improve the telegraph. The telegraph could send sounds and receive messages. But it could send only one message at a time in each direction. This meant that lines were often busy. People had to wait to send messages. Bell wanted to invent a machine that could read and send messages at the same time. More messages could then be sent and received. This would make the telegraph cheaper and easier to use.



➤ Bell's design for his telegraph led him toward inventing the telephone.

Bell did not have the time or skill to make all the parts he needed for his experiments. So he hired Thomas A. Watson to help him. Watson had worked a lot with electricity and his help was very important to Bell.

Bell and Watson needed to work fast. Other inventors were also trying to improve the telegraph. Bell worried about the inventor Elisha Gray. Bell wrote that it was a “neck-and-neck race between Mr. Gray and myself who shall complete an **apparatus** first.” Separately, Bell and Gray worked day and night to invent a better telegraph.



👉 Thomas A. Watson was an electrical engineer.

A Magnetic Discovery

Michael Faraday (1791-1867) discovered that a magnet can generate, or make, electricity. He then invented the generator, a machine that makes electricity. This discovery later helped Bell with his inventions.

Chapter 3

“Mr. Watson, Come Here!”

Bell found a way for the telegraph to send more than one message at the same time. He **patented** a machine called a “multiple telegraph.”

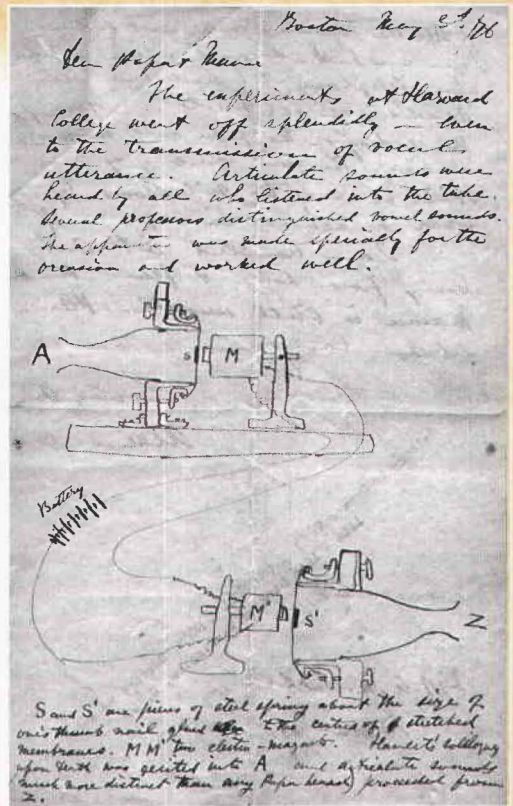
In March 1875 Bell traveled to Washington, D.C., to meet the famous scientist Joseph Henry. Bell showed Henry his new machine. Bell also told Henry about his idea for a telephone. Bell said that he did not have enough knowledge about electricity to continue. Henry said, “Get it!” The race to invent the telephone was on.

🕒 Joseph Henry (1797-1878) was the first director of the Smithsonian Institution, the famous museum and lab in Washington, D.C., shown here.



This sketch by Bell explains how the June 2, 1875, experiment later worked in his telephone.

On June 2, 1875, Bell and Watson made a big discovery. They were working on the multiple telegraph, using metal strips instead of tuning forks. In one room, Watson made the strips **vibrate**. In another room, Bell received the sounds. One of the metal strips got stuck, so Watson flicked it to get it unstuck. Bell heard the flicking noise. For the first time, sound had been transmitted by electricity. Now Bell and Watson knew it would be possible to send speech through the wire.



The Telephone

The word *telephone* comes from the Greek language. *Tele-* means “distant,” especially “to send over a distance.” *Phone* means “voice” or “sound.” A telephone is a device that converts sound into electrical impulses that are sent over wires.



🔗 Bell (shown here with Watson) was only 29 years old when he invented the telephone.

Bell and Watson started to build a model of their telephone. Bell thought that a **diaphragm**, or disk, would work to change sound better than a cluster of metal strips. The diaphragm was made of paper. It was shaped like the human eardrum. Bell drew the machine and Watson made it.

The machine had a wooden frame that held the sound receiver. A metal strip touched the diaphragm. Their first test did not work. The diaphragm was too tight and it broke. Bell and Watson tried a thicker diaphragm but that didn't work either. Bell and Watson kept working.

Bell was convinced they were close to success, so he decided to protect his invention. On February 14, 1876, Bell applied for a patent. Just a few weeks later, Bell and Watson found a way to make their invention work.

Bell called into the open end of the metal tube: “Mr. Watson, come here. I want to see you.” Watson ran down the hallway, smiling. “I heard you, Mr. Bell,” Watson said.

“Wait!” said Bell. “We must be sure there is no mistake. What did you hear, Watson? What were my exact words?”

“You said, ‘Mr. Watson, come here. I want to see you.’ I heard it clearly through the receiver.”

“This will change the world,” Bell said. He was right.



🕒 This painting depicts what happened after Bell's first complete sentence was carried through the telephone.

Chapter 4

Bell's Later Life

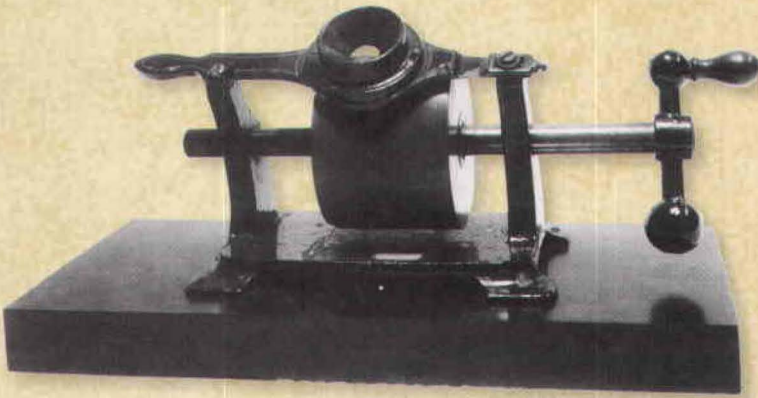
Bell started telling people all over the world about his new invention. He demonstrated the telephone for friends, scientists, and the general public all over the United States. In June 1876 Bell showed his telephone at the Centennial Exposition in Philadelphia. Bell won a prize for his invention. On October 6, 1876, Bell and Watson held the first two-way telephone conversation. Soon people wanted telephones in their homes and offices.

Bell's wife, Mabel, ↻ was hearing impaired from the age of four. She was one of the first children in the United States to learn to lip-read. Bell was her teacher.



The Graphophone

Bell called his graphophone “the greatest invention I have ever made.” It improved Thomas Edison’s **phonograph** and transmitted sound through light waves. Unfortunately the machine only worked when the sun was shining.



The telephone had made Bell rich. Bell could now spend all of his time inventing things.

Bell set up the Volta Laboratory. He invented many things at his laboratory, including the graphophone, which recorded and played back sound. He also invented an audiometer, which could test hearing.

In 1883 Bell founded ↻ a school for the hearing impaired in Washington, D.C. This lithograph shows him with one of his students.



In 1915 the first transcontinental telephone line was installed. Now people could make

a telephone call all the way from the East Coast of the United States to the West Coast—almost 3,000 miles (4,828 km) away.

When the line was put in, Bell telephoned his friend Watson. Bell lived in Washington, D.C. Watson lived in San Francisco, California. Bell again said the famous words, “Mr. Watson, come here. I want to see you.” Watson said, “But it will take me a week to reach you now!”

Calling Mr. Bell!

Telephone calls bothered Bell when he was working. He did have a telephone in his house, but he refused to have one in the room where he read and worked.

Conclusion

During his life Alexander Graham Bell received many awards and medals. But no matter how many honors he won, he kept on inventing.

On August 2, 1922, Alexander Graham Bell died. He was 75 years old. All the telephones in North America were silent for one minute to show respect. At that time there were 13 million telephones. Thomas Edison said that the telephone “brought the human family closer in touch.”



◀ Today's telephones have many features like multiple lines, speaker phone, and caller ID.

The Life of Alexander Graham Bell

1847	1863	1872	1875
Alexander Bell is born.	Bell and his brothers build a speaking machine.	Bell becomes a professor of speech at Boston University.	Bell patents his automatic telegraph.

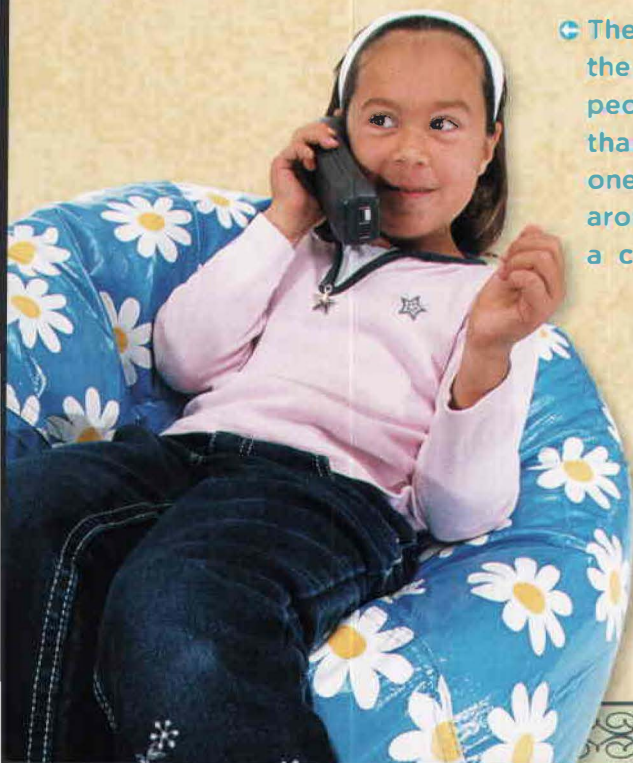
Bell's methods for teaching the hearing impaired are still used in schools today. The Alexander Graham Bell Association for the Deaf is the largest organization for the education of hearing impaired people in the United States.

Bell invented the telephone more than 100 years ago. Nowadays, telephones are everywhere. We have telephones in our houses, pockets, and cars. The telephone helps us communicate better. It comes in handy and solves many problems every day.

Scientists invented cell phones in 1947. The first cell phone company started in 1983. And who made the first call on it? It was Alexander Graham Bell's grandson!

1876	1877	1883	1922
Bell patents his telephone.	Bell marries Mabel Hubbard.	Bell opens a school for the hearing impaired in Washington, D.C.	Alexander Graham Bell dies.

Bell would probably not recognize today's telephones. They come in all shapes and sizes. Some are headsets. Others take photos. Someday people may even wear telephones on their wrists like watches.



• The year 2002 marked the first time more people had cell phones than land lines. Nearly one out of six people around the world had a cell phone.

Glossary

apparatus (*ap-uh-RAT-uhs*)
tools, equipment, or
machinery used for a
particular purpose (*page 11*)

diaphragm (*DIGH-uh-fram*)
a thin, flexible disc used
to change sounds into
electrical signals, or to
change electrical signals
into sound (*page 14*)

electricity (*i-lek-TRIS-i-tee*)
energy that is in the form
of a current. Electricity can
light lamps, heat houses,
and make appliances work.
(*page 8*)

hearing impaired (*HEER-ing
im-PAYRD*) unable to hear
well or at all (*page 4*)

inventor (*in-VEN-tuhr*) a
person who makes or
thinks of something that
did not exist before
(*page 2*)

laboratory (*LAB-ruh-tawr-ee*)
a room or building where
scientists carry out their
work (*page 2*)

patent (*PAT-uhnt*) to get an
official document issued by
a government that gives
a person or company the
right to be the only one to
make or sell an invention
for a certain number of
years (*page 12*)

phonograph (*FOH-nuh-graf*) a
machine for playing records
(*page 17*)

receiver (*ri-SEE-vuhr*) a
device that receives
electrical signals and
changes them into sound
or pictures (*page 2*)

scientist (*SIGH-uhn-tist*) a
person who works or
specializes in a branch
of science (*page 4*)

telegraph (*TEL-i-graf*) a
machine that sends and
receives messages over a
long distance (*page 4*)

vibrate (*VIGH-brayt*) to move
rapidly back and forth
(*page 13*)

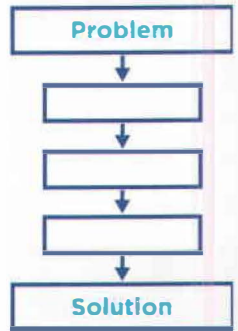
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Comprehension Check

Summarize

Use a Problem and Solution Chart to help you list the problems Bell solved as he worked on his inventions. Then use the information in the chart to summarize the book.



Think and Compare

1. Reread pages 12–15. Explain what problems Bell faced as he worked to invent the telephone. Tell how he solved them. **(Identify Problem and Solution)**
2. Pretend you could have helped Bell with any of his inventions. Which one would you choose? Why? **(Evaluate)**
3. Sometimes even the best inventions can have drawbacks. What are some disadvantages to telephones? Explain how people can overcome these disadvantages. **(Analyze)**

Literacy Activities



You Were There!

Pretend that you were there when Alexander Graham Bell and Thomas Watson found that they could transmit sound. Write a paragraph that describes what happened.



Research Sign Language

Many hearing impaired people use sign language in order to communicate. Sign language uses hand signals to represent letters and words. Use the library or the Internet to learn how to sign your first name.

Alexander Graham Bell

Alexander Graham Bell invented the telephone. Discover how this invention changed his life—and lives all over the globe.



4.2 Week 4

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