Everyday Life: COMMUNICATION

Walter A. Hazen

GOOD YEAR BOOKS

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Dedication

To Martha, Jordan, and Allison

Acknowledgments

Grateful acknowledgment to my editor, Laura Strom, who has guided me through several books in Good Year's "Everyday Life" series. Without her advice and support, this book would not have been possible.

I would also like to thank Roberta Dempsey, Acquisitions Manager at Good Year, for giving me the opportunity to be a part of such an exciting project. Her support and confidence in me is likewise appreciated.

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Design and Illustration: Sean O'Neill, Ronan Design
Editor: Laura Layton Strom
Editorial Manager: Suzanne Beason
Executive Editor: Judy Adams
Publisher: Rosemary Calicchio

Printed in the United States of America.
ISBN 978-1-59647-332-4
Previous ISBN 0-673-58664-2

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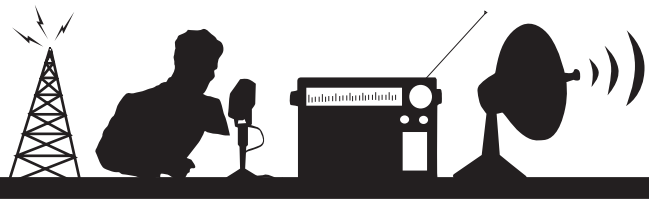

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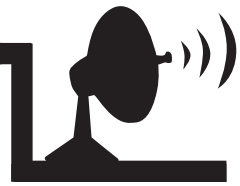


Introduction

Can you picture life today without newspapers, televisions, or computers? Or without telephones, radios, or mail service? Could we get along without our modems and fax machines? And what about simple devices such as ballpoint pens? Where would we be without these handy little tools?

Humankind, of course, had none of these conveniences for centuries. Instead, it had to cope with the most primitive means at hand. Because there was no other way to relay information quickly, the Athenian runner Pheidippides had to run 140 miles in 490 B.C. to deliver a message to the Spartans. Because news traveled so slowly even in the 1800s, the Battle of New Orleans was fought fifteen days after the treaty ending the War of 1812 was signed. And because Samuel F. B. Morse had not yet invented his famous telegraph and was away on business at the time, he did not receive word of his first wife's death in 1825 until days after her funeral.

Everyday Life: Communication traces the evolution of communication from smoke signals to computers. It is not a history about how things work as much as a story of how achievements in communication have affected and changed the lives of people everywhere. It is a story that is both informative and interesting.

As with other books in Good Year's Everyday Life series, each chapter in *Everyday Life: Communication* concludes with activities designed to motivate and challenge students in all areas of the curriculum. Included, among others, are exercises dealing with critical thinking, vocabulary, math, geography, writing, and reading comprehension. Several puzzles are also provided for students' enjoyment.

Walter A. Hazen

CHAPTER 1

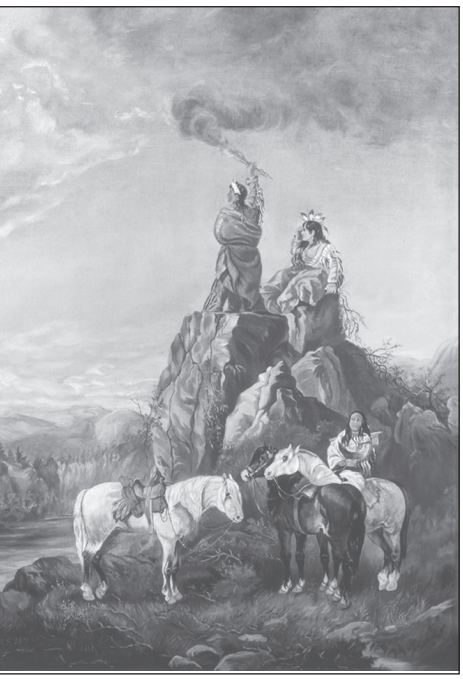
Smoke Signals and Other Early Means

A smile. A nod. A wave of the hand. A shake of the head. A grimace. A laugh.

What are all of the above? They are some of the ways in which we convey our thoughts and feelings to others. They are, in short, simple means of communication.

The earliest communicators in America were the Indians. Their gestures and body signals led to the development of a sign language that enabled one tribe to communicate with another. This form of language developed out of necessity, for there were more than twenty-two separate languages spoken on the Great Plains alone.

The number of words and ideas expressed in Indian sign language is probably not known. A recent Boy Scout handbook lists more than 600, many of which were natural gestures. An open hand placed behind the ear meant "listen." Rubbing the stomach with the palm of the hand indicated "hunger." A closed fist with the thumb pointing either toward or away from the communicator meant "me" and "you." Such signs proved invaluable in Indian communications with white traders, trappers, and military personnel. (Similar signs were later made part of a sign language that was developed for deaf people.)



Indians using smoke signals to convey a message. Smoke signals were one of the earliest forms of communication in North America.

Indians added to their language of signs with vocal sounds. Imitations of the calls of owls, wolves, coyotes, and other animals conveyed certain meanings. So did whistle sounds made by blowing through the wing bones of large birds of prey.

Indians also communicated through fires and smoke signals. A war or hunting party returning from a successful outing might build a single fire on a high hill visible to their village. The inhabitants of the village knew that one column of smoke meant good news, and they acknowledged its receipt by building two fires of their own.

As you are no doubt aware, smoke signals were accomplished by waving a blanket over a fire. There is no proof, however, that such puffs of smoke stood for individual words. Instead, they expressed certain ideas and

concepts understood by all Indians in a particular area. They also communicated by drums and, after they obtained them from white traders, mirrors.

Indians never developed a system of written language. Some tribes did, however, communicate certain ideas through pictographs. Pictographs are pictures that represent signs or symbols. They are not to be confused with hieroglyphics, the form of picture writing used by the ancient Egyptians and some Indian groups of Latin America. A pictograph simply expressed an idea and could not be "read" like hieroglyphics. A picture of a foot, for example, might stand for walk or travel. Likewise, a drawing of a bow and arrow might represent war.

The blazing of trees was another early form of communication. First used by Native Americans and then imitated by settlers, blazed trees were America's first "road signs." Blazes, or notches, were cut into the bark of trees to mark new paths through forested areas. Sometimes the location of the blazes indicated which path or road to take to reach a certain destination. In Maryland, for example, a road that turned off to a church was marked by notches made near the ground. Stones arranged in patterns were also used to guide travelers along America's earliest roadways.

In the days before printed materials, colonists could communicate only by letter and word of mouth. Early letter writing was quite different from letter writing today. Letters were not placed into envelopes but were instead folded and sealed with melted wax. The writer then stamped his or her personal seal into the wax to identify the sender. When the letter reached its destination, the recipient paid the postage. Letters were often left spread out on tables in inns and other places for people to look through and claim. You will learn more about early mail service in America in Chapter 3.

News for a village or town was often passed on by the town crier. The town crier was a gentleman who walked the streets and reported on events in a bellowing voice. Signaling his approach by beating a drum or ringing a bell, he would, in his capacity as local news anchor and weatherman, report on anything of interest or concern to the residents. Late at night he might be heard shouting something such as "Twelve o'clock and all's well" or "Two o'clock and a light snow falls." He

A town crier bellows out news of an event for all to hear. Judging from the behavior of the little girl in the foreground, the news must have been bad.

could even be expected to relay news of the coming and going of ships from England and elsewhere. Sometimes his messages spurred a whole town to action, such as when he reported on the disappearance of a child. Whether by day or night, his appearance was probably anticipated in the same way that we await the arrival of the mail carrier today.

News also reached the colonists by way of people passing through. Trappers, peddlers, and travelers might bring word of a storm or an epidemic in another town or colony. Settlers in remote areas were especially grateful for any news they received from travelers who stopped by for a brief stay.

Ringing the Liberty Bell atop Philadelphia's Independence Hall on July 4, 1776. Bells were used everywhere as an early means of communication.

Bells and gun shots were other means of early communication. The ringing of a bell could indicate a number of things: danger, the beginning of curfew, or a warning to residents that the town crier was about to make an important announcement. A prearranged code made it possible for everyone to understand the message being transmitted by the bell. (Today bells continue to serve as a means of communication. Church bells call people to worship. School bells inform students when it is time for classes to begin and end. Clock bells tell us the time. Doorbells let us know that someone has come calling.)

Nowhere was communication by bell or gun shot more important than on the early frontier. With homes and settlements spread far apart, frontier people depended on a signal from a nearby blockhouse (small fort) to alert them of danger. When settlers heard the coded message of a bell or gun, they dropped what they were doing and hurried to safety inside the blockhouse walls.

Guns continued to transmit messages even on the last frontier, or the Wild West, as it is sometimes called. To alert distant homesteaders that the festivities surrounding a holiday such as the Fourth of July were about to begin, townspeople would often fire a large cannon that could be heard for miles around. The sound of the cannon told amusement-starved pioneers that it was time to drop all work and strike out for town and a day of fun.

Name _____ *Date* _____

Sentence or Fragment?

Here are 10 statements. Some are fragments, while others are complete sentences. On the line to the left of each, write **F** if the statement is a fragment or **S** if it is a complete sentence. Lines are provided for you to write complete sentences for those statements you mark as fragments.

Remember that fragments are statements that lack either a verb or a subject or do not express a complete thought.

1. ____ Smoke signals rising in the distance.

_____

2. ____ Sending a message by fire.

_____

3. ____ Some North American Indians used pictographs to express ideas.

_____

4. ____ Notched trees often guided travelers along early trails.

_____

5. ____ Stones arranged in a certain way.

_____

6. ____ Letters at one time were folded and sealed with wax.

_____

7. ____ Letters left spread out on tables in taverns and inns.

_____

8. ____ The town crier announcing his news in a loud voice.

_____

9. ____ Settlers welcomed news brought to them by travelers and others.

_____

10. ____ The report of a gun warning settlers of approaching danger.

_____

Name _____ *Date* _____

Perform a Skit (A Teacher-Directed Activity)

In this chapter you learned how Indians and settlers communicated in the early days of our country. Indians, for their part, relied on signs and other nonverbal means to get their ideas across. With this in mind, participate in one of the following skits. Think of natural signs, gestures, grunts, groans, or any other means that you could use to make yourself understood. No talking allowed!

Skit 1—An Indian explaining to members of another tribe that a ship bearing European settlers has landed nearby

Skit 2—Several settlers asking a group of Plains Indians for directions to a particular place

Skit 3—Indians warning a group of settlers that they have encroached upon sacred burial grounds and that they had best leave

Skit 4—A group of Plains Indians reproaching (scolding) white hunters for slaughtering buffalo only for their hides

Any student not participating directly in a skit might make simple props for those who are. Also, some students might try to convey a message by developing a rebus. Explain to the students that a rebus is a form of writing that combines pictures, or sometimes pictures, words, and letters together, to express an idea. Egyptian hieroglyphics, consisting solely of pictures, serve as good examples of rebuses.

Rebus example:

I	see	you

Name _____ *Date* _____

Make a Communications Mobile

A mobile is a unique way to convey or illustrate an idea. You can easily make a mobile with a few simple materials and a good imagination.

Following the directions given and using the materials suggested at right, make a mobile depicting early means of nonverbal communication.

You can make a more detailed mobile by attaching your stringed tags to pieces of stiff wire about six inches in length. Each piece of wire should be bent slightly in the middle to give it a rainbow shape. Tie a tag to both ends of each wire and then suspend all the wires from the clothes hanger on different lengths of string.

To Make Your Mobile You Will Need:

1. A large clothes hanger
2. Different-colored construction paper or index cards
3. String
4. Hole punch
5. Felt-tip pen
6. Crayons or colored pencils
7. Pieces of stiff wire (if you choose to make a more detailed mobile)

Here Is What You Do:

1. Cut different colors of construction paper or index cards into tags measuring about 2 x 3 inches. Cut tags into various shapes: circles, squares, triangles, rectangles, stars, and so on.
2. On each tag illustrate one form of early communication. You might, for example, draw and color small pictures depicting communication by such means as smoke signals, sign language, bells, guns, and notched trees. Label each tag.
3. Punch a hole at the top of each tag.
4. Insert and tie a piece of string through the hole at the top of each tag. Make your pieces of string different lengths so you can stagger the tags on the clothes hanger.
5. Attach the tags to the bottom of the clothes hanger.
6. Make a sign reading "Early Means of Communication" and attach it to the top of the hanger.

Name _____ *Date* _____

Finish a Story

Here is the start of a story involving two frontier children ready for a day of adventure. On the lines provided, write a conclusion to the story, giving it any ending you like. Continue on a separate sheet of paper, if necessary.

One cold day in January, Jordan and Allison sneaked out of Boonesborough and decided to do some exploring on their own. Making use of the knowledge passed on to them by their woodsman father, Walt, they notched trees as they went along so they would be able to find their way back.

Considering themselves devilishly clever, the two youngsters pushed deep into the dense forest. For hours they frolicked, taking in everything their eyes could see. Finally, tired and wanting to get back to the fort before dark, they turned to begin the long trip home.

After proceeding a short distance, Jordan stopped dead in his tracks.

"Allison, look!" he cried. "Can you believe this?"

"Oh, Jordan," Allison moaned, "what are we going to do?"

Both children stared in disbelief at the scene before them. While they had been engaged in their adventure, pranksters—whether Indian or settler is not known—had notched trees in every conceivable direction leading away from their original path. The children had no idea which trail led to the fort.

CHAPTER 2

Newspapers, Books, and Magazines

Communication by printed word got off to a slow start in the American colonies. The first printing press did not arrive from England until 1638, and the first newspaper did not appear until 1690. That paper, *Publick Occurrences*, lasted all of one issue. The royal governor of Massachusetts objected to several of its articles and closed it down after the first day.

Sir William Berkeley, the royal governor of Virginia in the early 1600s, once stated that he was grateful that no free press (newspaper) existed in the colonies. His opinion reflected that of the British government: that a free press would only stir up the colonists and cause them to think of such unpleasant things as disobedience and rebellion.

The first regularly scheduled newspaper in the colonies was the *Boston News Letter*. It was started in 1704 by a printer named John Campbell. By 1715 New England had six weekly newspapers, and by 1760 every colony except Delaware and New Jersey could boast of at least one. Fifteen years later there were more than 100 newspapers being printed throughout the thirteen colonies.

Avid readers catch up on the news in a New York coffee house. By the late 18th century, newspapers were widespread throughout the English colonies.

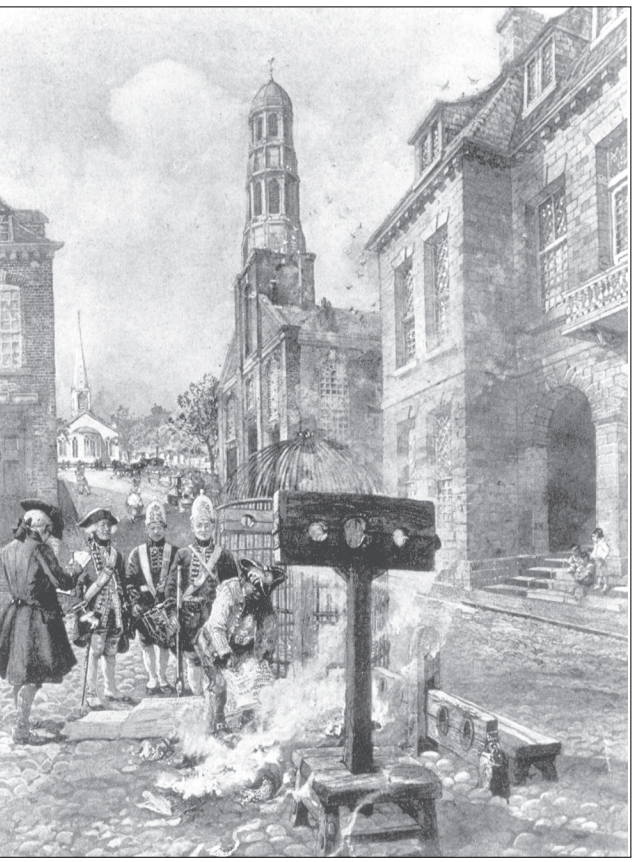
Except in the larger towns, most colonial newspapers were printed weekly. These were usually four-page publications whose first page was devoted to news from Europe. The other pages contained local news and items of interest to the colonists. Buyers might read an essay written by the editor on such topics as the pitfalls of drunkenness or the qualities of a good husband. They might read and sigh at the rash of bad poems sent in by equally bad poets. Or, as some readers of newspapers do today, they could concentrate their interest on the many advertisements appearing throughout the pages of the journal.

Newspaper advertisements tell us much about everyday life in the colonies. An advertisement that appeared in 1733 proclaimed the wonders of one Richard Noble's whitewash brushes. Mr. Noble not only made paintbrushes but mended them as well. Further, he paid good money for

superior hog bristles (hairs), which he used to make his brushes. If the hog bristles were cleaned and combed, the seller received one shilling for each pound. If the bristles were uncombed, the seller received considerably less.

Whether advertisement or article, what appeared in colonial newspapers had to meet with the approval of the British government. Printers and editors rarely challenged this restriction until 1722. In that year James Franklin, editor of the *New England Courant*, a Boston newspaper, got himself in trouble with the Massachusetts legislature in a big way. Mr. Franklin wrote an editorial charging certain legislators with taking bribes from pirates operating off the coast. Needless to say, those accused were furious and threw Mr. Franklin in jail for a month. While he was there, the *New England Courant* was ably run by Mr. Franklin's 16-year-old half brother, Benjamin. Benjamin, as you probably know, later became a well-known printer in his own right.

A few years after James Franklin's arrest in Boston, a publisher in New York also got into trouble for criticizing British authority. But this time the result had far greater significance. The arrest, trial, and acquittal of printer John Peter Zenger helped bring about freedom of the press in America.



British officials burn John Peter Zenger's *New York Weekly Journal*, November 6, 1734. Note the pillory in the foreground.

In 1733, Zenger, a German immigrant who had been an apprentice in New York, started his own newspaper, the *New York Weekly Journal*. From the start, his paper began to attack the royal governor, William Cosby. Zenger charged that the governor took bribes and rigged elections. The governor was not amused. He ordered Zenger to stop printing such libelous nonsense. When Zenger refused, the governor had him thrown into jail.

The trial of John Peter Zenger in 1735 was one of the most important trials in American history. Its outcome established an important principle of American democracy: that newspapers are free to criticize the government as long as what they print is true.

In Zenger's case his lawyer, Andrew Hamilton, convinced the jury that what his client had printed was indeed the truth. Governor Cosby had taken bribes and had rigged elections, and in bringing this

to the attention of his readers, John Peter Zenger was not guilty of anything. The jury agreed and acquitted him.

If newspapers took a long time to take hold in the colonies, books took even longer. Books were both scarce and expensive; only the clergy and wealthy could afford them. The cost and scarcity of books were due to several reasons. One was that printers had only one or two sets of type, limiting them to printing a single page at a time. Another was a shortage of paper. All paper had to be imported from Europe, and not only was it expensive, but it was also taxed by the British government. The first paper mill in the colonies did not open until 1690. Some colonies did not have paper mills until well into the 1700s.


+ A a b c d e f g h i j k l m n o p q
r ſ s t u v w x y z & a e i o u
A B C D E F G H I J K L M N O P Q
R S T U V W X Y Z

a e i o u	a e i o u
ab eb ib ob ub	ba be bi bo bu
ac ec ic oc uc	ca ce ci co cu
ad ed id od ud	da de di do du

In the Name of the Father and of the Son, and of the Holy Ghoſt. *Amen.*

OUR Father, which art in Heaven, hallowed be thy Name: thy Kingdom come, thy Will be done on Earth, as it is in Heaven. Give us this Day our daily Bread: and forgive us our Treſpaſſes, as we forgive them that treſpaſs againſt us: And lead us not into Temptation, but deliver us from Evil. *Amen.*

Replica of a hornbook used in 18th century colonial America. Earlier hornbooks commonly had the alphabet and the Lord's Prayer printed on opposite sides.

Because of the cost of printing, few books were even set in type until a certain number of people promised to buy them. Also, early book printers were careful not to publish any book that might offend anyone or raise the anger of government officials. "Safe" books included such publications as Benjamin Franklin's *Poor Richard's Almanack* and *The New England Primer*, an early school book.

In general, most colonial families possessed only two books: the Bible and an almanac. An almanac is a yearly publication containing all kinds of information useful to readers. Although almanacs today are much larger and cover more topics, they still include many of the same things as those of colonial times. This is especially true of *The Farmers' Almanac*, which offers information to farmers concerning the best times for planting crops.

The most popular almanac in the colonies was *Poor Richard's Almanack*. Franklin gave his book that title because he wrote under the pseudonym (fictitious name) of Richard Saunders. He made out Richard Saunders to be a poor astrologer who spent his time offering information and advice to all who would listen.

Franklin printed *Poor Richard's Almanack* from 1732 until 1757. During those twenty-five years, his book provided readers with information on a wide variety of subjects. It predicted changes in the weather and in the phases of the moon. It told the hours of sunrise and sunset and the times of low tide

and high tide. It listed holidays, major events, and all court sessions. Everything of interest to people at the time could be found between the pages of Franklin's short book.

Franklin's almanac was favored over others for two reasons. First, he printed the book in three regional editions. There were separate editions for the New England, Middle, and Southern Colonies. Franklin felt this was necessary because each region had its own unique weather and geography. Second, Franklin's almanac was chock-full of jokes, verses, and wise sayings (proverbs). Most of these proverbs advised people about how to be happy, healthy, and successful. Others had to do with thrift, or the wise use of money. Franklin wrote so much about saving money that some writers have called him the "Father of Thrift."

A page from the *New England Primer* containing rhymed proverbs. The primer used in New England for many years was also referred to as the Little Bible.

Many of Benjamin Franklin's sayings are still popular today. Below are several you may be familiar with:

"A penny saved is a penny earned."

"A word to the wise is enough."

"Early to bed and early to rise, makes a man healthy, wealthy, and wise."

These and other well-known sayings of Benjamin Franklin are included as part of an activity at the end of this chapter. For now, we turn briefly to the last type of printed material to appear in the colonies: the magazine.

You might be surprised to learn that the word *magazine* means "storehouse" or "treasury." And that is what it was intended to be: a storehouse of articles and stories illustrated with pictures. Although popular in Europe as early as 1704, magazines in America were slow to catch on. Andrew Bradford's *American Magazine* and Benjamin Franklin's *General Magazine*, both of which appeared in 1741, were short-lived. Bradford's magazine lasted only three months and Franklin's six. But these unsuccessful ventures paved the way for later magazines that would have a huge impact on American history. In 1775 it was the *Pennsylvania Magazine* that printed Thomas Paine's famous essay "On Liberty," which helped bring about the American Revolution.

Name _____ *Date* _____

Interpret Some Famous Proverbs

Here is a selection of sayings from Benjamin Franklin's *Poor Richard's Almanack*. On the lines provided, write what you think each quote means.

"Three may keep a secret if two of them are dead."

"A penny saved is a penny earned."

"A word to the wise is enough."

"Haste makes waste."

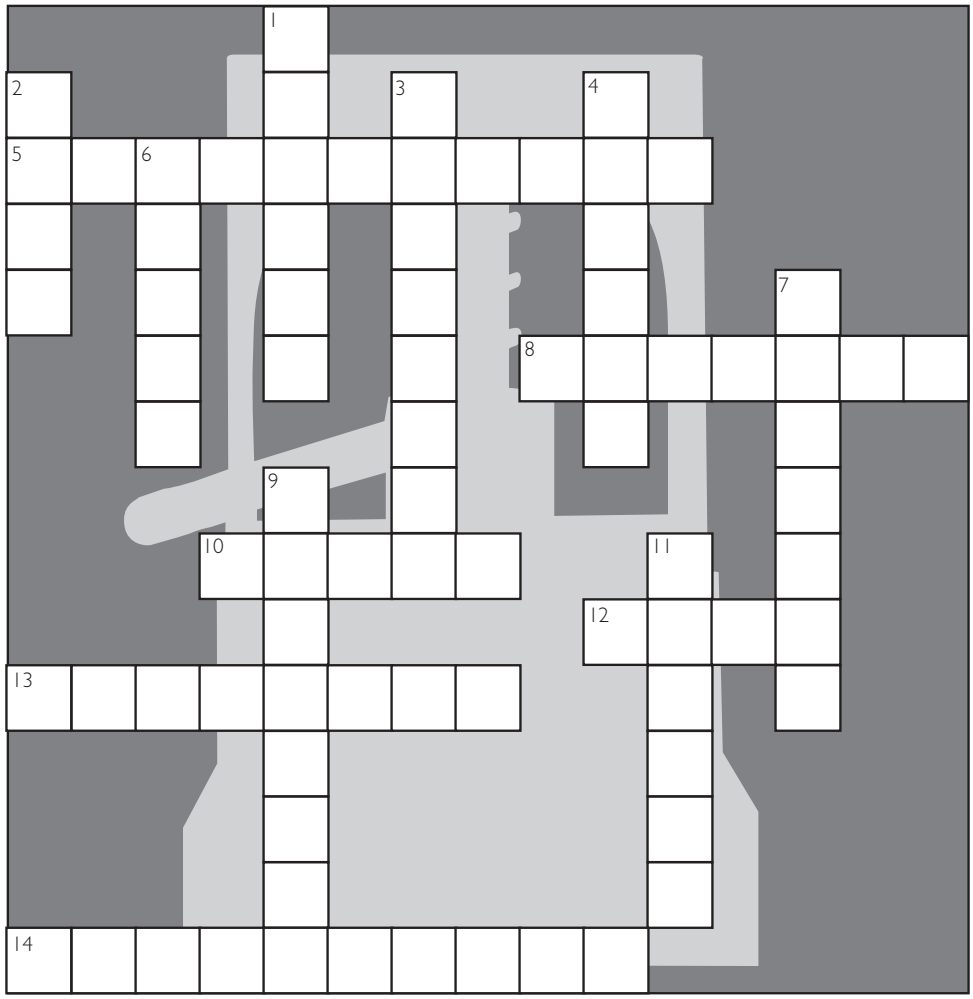
"Well done is better than well said."

"Early to bed and early to rise, makes a man healthy, wealthy, and wise."

"Little strokes fell great oaks."

Name _____ *Date* _____

Solve a Publishing Crossword



Across

5. *Publick* _____
8. Franklin's _____ *Magazine*
10. Its shortage made books scarce.
12. Number of pages in most colonial newspapers
13. James Franklin's half-brother
14. A young man learning a trade

Across

1. Benjamin Franklin, the Father of _____
2. _____ *Richard's Almanack*
3. One of two colonies not having a newspaper by 1760
4. His trial established freedom of the press.
6. Governor criticized by John Peter Zenger
7. A wise saying
9. It means *storehouse* or *treasury.*
11. *The* _____ *News Letter*

Name _____ *Date* _____

Unscramble and Identify Famous Persons

Listed are the scrambled first and last names of eight persons mentioned in Chapter 2. Unscramble each, and write the correct spelling on the line next to it. On the line below each scrambled name, write either who that person was or what he accomplished.

1. MILLWIA KEYREBEL _____

_____

2. NOHJ PLECBALM _____

_____

3. MAJES LARKFINN _____

_____

4. JAMBENIN FLINRANK _____

_____

5. HONJ GREZEN _____

_____

6. LAWMILI SYBOC _____

_____

7. REWAND LIMANOTH _____

_____

8. DRAWEN DROFDARB _____

_____

9. AMOSTH INAPE _____

_____

Name _____ *Date* _____

Name Those Newspapers and Magazines

As America grew, new methods of printing led to the circulation of greater numbers of books, newspapers, and magazines. Limited space in the narrative prevented telling the story of how some of these leading publications got started.

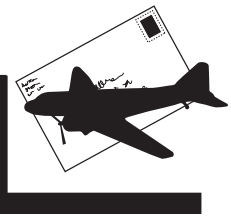
Using an encyclopedia, almanac, or other source, list eight of the leading or best-selling newspapers and magazines in the United States today.

America's Leading Newspapers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

America's Best-Selling Magazines

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____



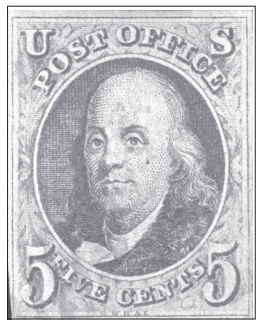
CHAPTER 3

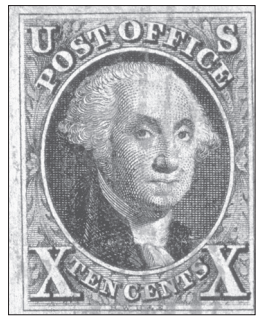
The Mail Service

As you learned in Chapter 1, early mail service in America left a little to be desired. The "postman" delivered letters to a local tavern, where they were dumped on a table and left for addressees to claim. This form of delivery was commonplace until Benjamin Franklin became the postmaster general of the colonies in 1753. More about that later.

Even before any kind of postal system appeared, letters found their way from place to place. A traveler or a ship's captain going in the same direction as a piece of mail might be asked to deliver it. Sometimes a ship's captain would even see that letters got as far as Europe. As for letters being delivered by a traveler, the writer of the letter wrote directions to the receiver's house on the outside of the sealed paper. This was necessary because houses did not have numbers in those days. A typical letter might be addressed in this way:

Miss Priscilla Brewster
Near the Silversmith's Shop
On Liberty Street
Boston, Massachusetts





Postage stamps honoring Benjamin Franklin and George Washington, printed in 1847. They were the first postage stamps issued in the United States.

The first postal system of any kind in America began in 1639. In that year the legislature of the Massachusetts Bay Colony authorized Richard Fairbanks to receive at his home in Boston all mail arriving by ship. The colonial government paid him a penny for every letter he accepted and agreed to deliver.

One of the first regular mail services that delivered letters overland started operating between New York and Boston in 1673. Mail carriers were called "post riders" because they changed horses at various posts, or stations, along the way. Although their primary responsibility was to carry the mail, post riders were also expected to report on the condition of all ferries, roads, and fords (river crossings). By the time of the Revolution, post riders were delivering mail up and down the Atlantic coast between New England and Georgia.

Writing letters during colonial times was risky. Personal correspondence was opened and read as a matter of course. Anyone who said something nasty about the king or a colonial governor ended up in jail. Freedom of mail, in fact, did not come about in America until 1782. In that year, the Continental Congress ordered that private letters could not be opened by postal authorities.

In some areas mail was not delivered more than eight times a year. Letters were allowed to accumulate until the postmaster was guaranteed enough of a fee to justify seeing them delivered. Weather also played a part in how often the mail got through. On the post route between New York and Albany, for example, the post rider often became the "post walker." And, during times when the Hudson River was frozen, he became the "post skater."

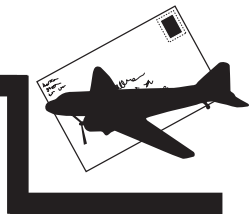
Mail service improved considerably when Benjamin Franklin became the colonial postmaster general. Franklin saw to it that post riders traveled at night as well as by day. He lowered the charge for postage and allowed riders to carry newspapers in addition to letters. He further improved service by having post roads constructed to link major colonial cities. Today, a highway between Boston and New York is still called the Boston Post Road.

New developments in postal service came quickly in the 1800s. By 1830 there were more than 115,000 miles of post roads, and mail was being carried by stagecoach. In 1847 the first postage stamps and envelopes came into use. Registered letter service began in 1855, and three years later the first street mailboxes appeared. Also in 1858, mail service by stagecoach began between Missouri and California. Mail coaches took a southern route through Texas; the long and dangerous journey took 25 days to complete.

Mail carriers of the late 1800s. For many years, mail was delivered by the U.S. Army.

Because the overland mail delivery to California took so long, a new but brief period in mail service started on April 3, 1860. This was the period of the famed Pony Express. Although short-lived, the Pony Express stands as one of the most exciting events in American history. Many books have been written about the brave riders who fought bad weather, outlaws, and sometimes hostile Indians to carry mail over a distance of 1,966 miles.

The Pony Express was the brainstorm of a freighting company named Russell, Majors, and Waddell. The company guaranteed it could cut the delivery time of mail between Missouri and California in half. To launch its enterprise, the company bought 500 fast horses and built 190 relay stations between St. Joseph, Missouri, and Sacramento, California. It spaced the relay stations 15 miles apart and manned them with station managers and fresh horses. All that remained was to hire the riders.



Russell, Majors, and Waddell advertised for "daring young men, preferably orphans." Many boys and young men interested in adventure answered the call. About 80 were hired in all, and each was guaranteed from $100–$200 a month, good pay for the time. You are probably familiar with several of the riders who rode for the Pony Express. One was William F. Cody, who later became known as Buffalo Bill. Another was "Wild Bill" Hickok, who would go on to make a name for himself as a frontier marshal.

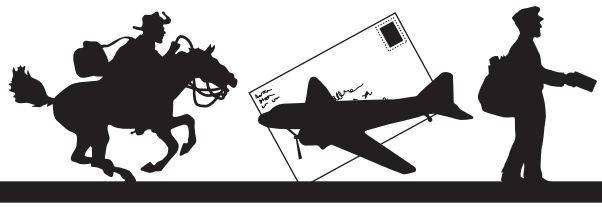
A Pony Express rider makes his away across the Plains in this 1861 wood engraving. The object at the right is a burial platform on which rests the body of a deceased Sioux Indian.

Here is how the Pony Express worked. A rider galloped off from a relay station carrying twenty pounds of mail in a leather, waterproof mail bag. He rode as fast as he could toward the next station. As he drew near, men who worked at the station got a fresh horse saddled and ready. The rider approached at breakneck speed, dismounted with his mail bag, and jumped onto a fresh horse. He then proceeded to the next station, 15 miles away. He rode an average of 75 miles a day, riding 5 different horses in the process. If by some chance his replacement at a particular station was ill or failed to show up, the weary rider rode on until he could be relieved.

The Pony Express ended on October 24, 1861, after only eighteen months in operation. Railroad expansion and the introduction of the telegraph made the relay of mail and messages much faster. But during its brief lifetime, the Pony Express was responsible for delivering exactly 34,753 pieces of mail between Missouri and California.

In the years following the decline of the Pony Express, improved means of transportation led to many innovations in mail service. In 1863 free home delivery for cities began, and this service was extended to rural areas in 1896. The first post cards were issued in 1873, and special delivery began in 1885. Parcel post, the branch of the postal service that handles packages, was introduced in 1913.

If the Pony Express was the most colorful development in the history of the United States postal system, the most important was the beginning of airmail. The first recorded airmail flight occurred between the New York cities of Garden City and Mineola in 1911. Army pilots then delivered mail between New York, Washington, and Philadelphia until the Post Office Department officially began regular airmail service in 1918.



The Post Office Department's first airmail flight was far from impressive. The plane wouldn't start, and it was some time before someone noticed the gas tank was empty. Afterwards, with fuel in the tank and amid much applause, the pilot took off from Washington, bound for New York City. But he got lost! Not only did he get lost, but he also was forced to land in a cow pasture. The embarrassed Post Office had no choice but to send the mail on to New York by train. (As though its first flight was not disaster enough, the Post Office issued early airmail stamps with a picture of a biplane accidentally printed upside-down.)

At first, all airmail flights took place during daylight hours. Planes landed when darkness approached, and the mail continued on by railroad. Then in 1921 a pilot named Jack Knight flew the mail by night from Omaha, Nebraska, to Chicago, Illinois. His feat was part of the first coast-to-coast delivery of mail entirely by airplane. Three years later, airmail planes began to fly at night on a regular basis.

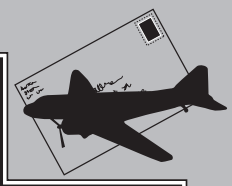
A mail plane enroute from San Francisco to New York in 1928. By that date, delivery of the mail by air was commonplace.

Mail service underwent a huge change in 1971. In that year the Post Office Department was abolished and replaced by the United States Postal Service. It functions in the manner of a business, generating income through the sale of stamps and services. It has become the largest civilian employer in the country.

The U.S. Postal Service has shortened delivery times of mail and parcels by offering both Express Mail and Priority Mail. Express Mail guarantees customers next-day delivery on letters and packages. Priority Mail promises delivery in two or three days but at a much cheaper price.

Another innovation of the U.S. Postal Service has been the use of zip codes. ZIP stands for Zoning Improvement Plan. Five-digit zip codes were introduced in 1963, and codes with nine numbers followed in 1983. The four additional digits added to the original five and separated by a hyphen serve to direct mail to an even smaller area. To date, people are encouraged but not required to use the extra four-digit code.

Communication by mail has seen many new developments since letters were first delivered in colonial times. In those 300-plus years, mail has been carried by horse, railroad, truck, and airplane. Do you think space shuttles will be added to this list of carriers in the future?



Name _____ *Date* _____

Solve Some Pony Express Math Problems

Here are four word problems associated with the Pony Express. Space is provided for you to work, along with lines on which to write your answers.

1. When the Pony Express began, it took riders 10 days to cover the 1,966 miles of the route. What was the average number of miles covered each day?

   _____ miles

   In time, the number of days required to carry the mail from Missouri to California and vice versa was reduced to eight days. What was the average number of miles covered each day?

   _____ miles

2. Relay stations along the route of the Pony Express were spaced an average of 15 miles apart. How many relay stations were there in all? (Round your answer.)

   _____ relay stations

3. Pony Express riders were paid $100–$200 a month. What were the total earnings of a rider who worked all 18 months the service was in operation and who was paid $125 a month for the first nine months and $150 a month for the last nine?

   _____ total earnings

Name _____ *Date* _____

Draw Conclusions from What You Have Read

An important reading skill involves drawing conclusions from facts you have read. With this in mind, read each of the statements. Then answer the questions using the information presented.

1. Throughout the colonial period, personal mail could be opened and read by postal officials. How do you think this influenced what people wrote?

_____

_____

2. Early mail delivery consisted of a post rider taking letters to a tavern and dumping them onto a table for people to claim. What do you think might have happened to some letters?

_____

_____

3. The Pony Express advertised for young men who were wiry and preferably orphaned. What does this tell you about the nature of the job?

_____

_____

4. Anyone sending a letter by the Pony Express was required to write on tissue paper. Why do you think the use of regular paper was disallowed?

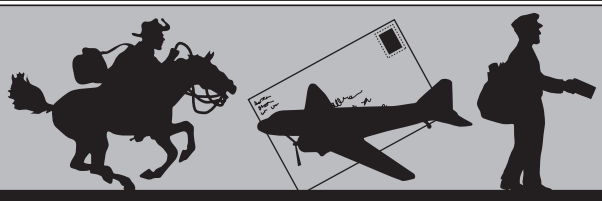
_____

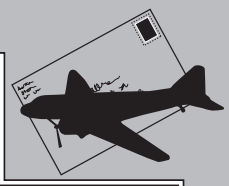
_____

5. Until 1924 all airmail flights took place during daylight hours. Why do you think this was?

_____

_____





Name _____ *Date* _____

Arrange in Chronological Order

Indicate by the numbers 1 to 14 the order in which the events listed occurred.

____ Post Office begins regular airmail flights.

____ First regular mail service starts between New York and Boston.

____ United States Postal Service replaces the Post Office Department.

____ First post cards come into use.

____ Night airmail flights begin.

____ Massachusetts Bay Colony authorizes the first postal system in America.

____ Nine-digit zip codes are introduced.

____ Continental Congress establishes freedom of the mail.

____ First street mailboxes appear.

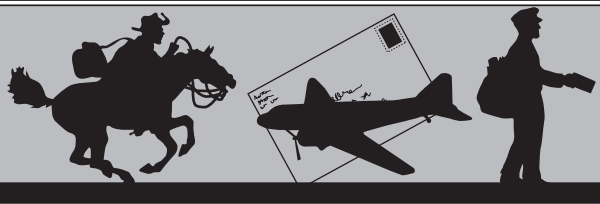
____ First postage stamps are issued.

____ Parcel post begins.

____ Pony Express is launched.

____ Special delivery begins.

____ Benjamin Franklin is named postmaster general of the colonies.

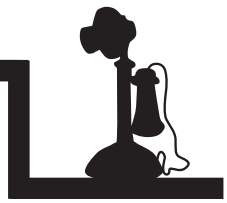


Name _____ *Date* _____

Create a Dialogue

You will recall from the chapter that the Post Office Department's first regular airmail flight ended with the pilot getting lost and having to land in a cow pasture.

Create a dialogue between two bystanders who happened to witness this not-too-glorious beginning of airmail service in the United States.

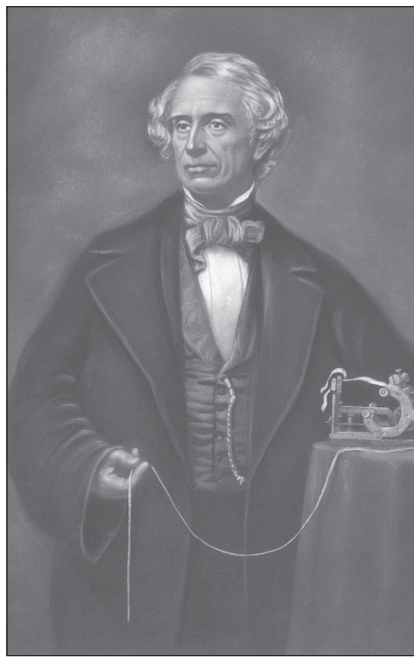


CHAPTER 4

The Telegraph and the Telephone

On May 24, 1844, an artist-turned-inventor named Samuel Finley Breese Morse made communications history. With members of Congress looking on, Morse sent a coded message that traveled along a wire extending from the Supreme Court Chamber of the Capitol in Washington, D.C., to Baltimore, Maryland. The message was brief. It simply read, "What hath God wrought?" An instant later, the same message was tapped back to Washington by Morse's partner in Baltimore. In those brief moments, the telegraph was born, and the age of modern communication had begun.

Samuel F. B. Morse came very close to never becoming an inventor. He studied to be a portrait painter, and, during his early years, was highly successful at his craft. One of his most famous portraits was a life-sized painting of the Marquis de Lafayette, the French general who fought for America during the Revolutionary War. That painting hangs today in the New York City Hall. A second portrait he painted of Lafayette hangs in the New York Public Library.

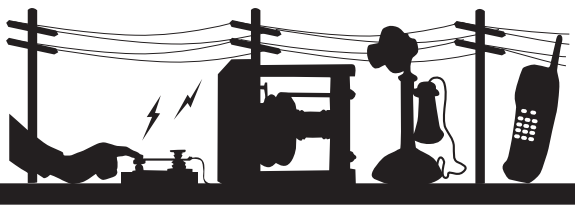


Samuel F. B. Morse with his first telegraph, which he invented in 1837.

It was while returning home from further study in Europe in 1832 that Morse's life took a turn toward science. One day on board the ship *Sully*, he overheard a group of men talking about electricity. They told him that scientists in Europe had proved that electric signals could be sent over wire. This got Morse to thinking. If electricity could be transmitted over a wire, why not a message? He departed ship in New York determined to build an apparatus with which to test his theory.

From 1832 on, Morse neglected his art and devoted most of his time to working on his invention. He painted just enough to earn money for food and other necessities.He lived and slept in a small one-room office in New York. He cooked all his meals himself. Sometimes he went hungry, but he was not discouraged. Working far into the night, he never lost faith in his ability to see his dream come to a successful end.

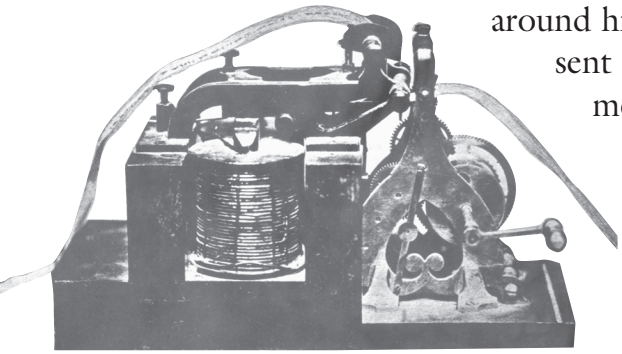
Morse read everything he could find on electricity. Although people had known about electricity for many years, little use had been found for it. But a few years before Morse began his experiments, an Englishman named William Sturgeon invented the electromagnet. An electromagnet is a piece of soft



metal wound with wire. When a current of electricity is sent through the wire, the metal acts as a magnet. When the current is interrupted, the metal loses its magnetic qualities.

Morse reasoned that he could use an electromagnet to develop his transmitting device. Using the magnet, he discovered he could break a current of electricity flowing through a wire and spell out a message. Every time the current was broken there was a clicking noise. All that was left then was to apply this principle to his idea of transmitting a message along the wire.

We are far ahead of our story, however. Samuel Morse did not just sit down and start sending messages hither and yon. He worked five long years before his telegraph was ready to demonstrate. Because he lacked the money to buy reels of insulated wire, he bought wire piece-by-piece and soldered it together. Then he wrapped the wire in cotton thread. Work proceeded at a faster pace when he received the financial backing of a friend's wealthy father, Alfred Vail.

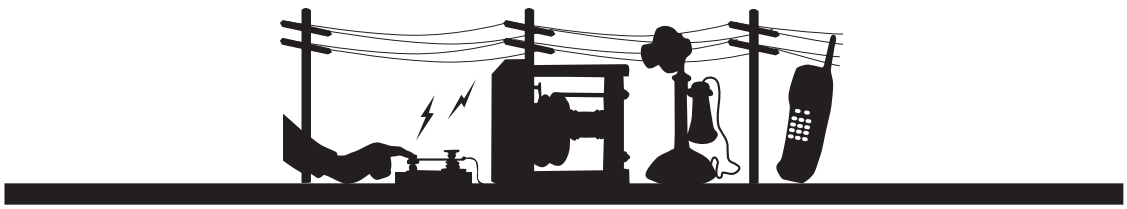


An early telegraph. Messages were sent using "dots" and "dashes" that represented letters and numbers.

Morse began experimenting by running a half mile of wire around his small room in New York City. Using a battery, he sent a current of electricity through the wire to a piece of metal attached to the far end. Around the metal he had coiled the wire, thus creating a simple electromagnet. He used a key, or lever, to open and close the circuit. Holding the key down a short time created a "dot" in the code that he and Alfred Vail had developed. Holding it down for a longer time created a "dash." These dots and dashes, used separately or in combination, took the place of letters in what came to be called the Morse code.

At first Morse's invention was looked upon as a novelty. But, as you learned at the beginning of this chapter, he finally received funding from Congress to erect a line of telegraph poles from Washington to Baltimore. His first message *("What hath God wrought?")* was selected by Miss Annie Ellsworth, the daughter of the Commissioner of Patents. It was Miss Ellsworth who brought Morse the good news that Congress had passed the bill to install the telegraph.

Morse's invention revolutionized communication. Soon telegraph lines joined all major U.S. cities, and, by 1861, they extended from coast to coast. Cables for transmitting messages were even laid underwater. The first



transatlantic cable was laid in 1858, and, by 1898, there were 15 such cables joining the United States and Europe. The Pacific Ocean was first spanned by cable in 1902.

In time, sending coded messages over wire gave way to the teletype machine and other devices. But in between, people started wondering if the human voice could be transmitted over wire in the same manner as telegraph signals. Several scientists conducted experiments with little success. The person who actually succeeded—Alexander Graham Bell—did so by sheer accident.

An undated engraving showing Alexander Graham Bell's telephone in use.

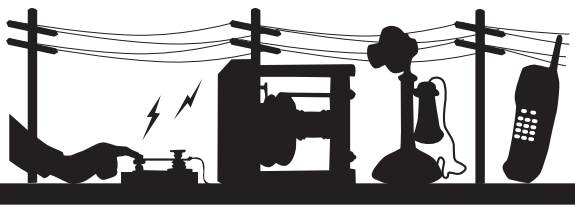
Alexander Graham Bell was born in Scotland in 1847. Both his father and his grandfather were teachers of the hearing impaired. When Graham, as he was called, finished his studies at the University of Edinburgh, he too became a teacher of the hearing impaired. In 1868 he moved with his family to London, where he assisted his father, Melville, in teaching speech to students with hearing losses. Alexander Melville Bell had developed a method of teaching speech and lip reading called Visible Speech. Using this method, Graham used diagrams illustrating how letters and words are formed by the mouth to teach many of his students how to speak and read lips.

Alexander Graham Bell makes the first long-distance call from New York to Chicago in 1892. He had accidentally invented the telephone 16 years earlier.

Young Bell might have remained in England had disaster not struck his family. Both his brothers died of tuberculosis, and Graham Bell himself came down with the disease. Melville Bell decided that, to save his son's life, the family would have to leave England and its damp climate. In 1870, the Bell family relocated to Brantford, Ontario, in Canada. The move worked miracles for Graham Bell. He soon recovered and began teaching again.

In 1871 the principal of a school for the hearing impaired in Boston invited Melville Bell to demonstrate Visible Speech to her students. Mr. Bell could not go and sent his son Graham in his place. One year later, Graham Bell opened his own school for the hearing impaired in Boston. It was there that he began experimenting with electricity.

Several stories exist as to how Alexander Graham Bell accidentally invented the telephone. One holds that he was trying to make a hearing aid for Mabel Hubbard, one of his students, whom he later married in 1877. Another, and the one most commonly found in books, is that he hit upon the



telephone while trying to improve on the efficiency of the telegraph.

Bell had developed an interest in electricity and the telegraph while still in Europe. In Boston he lived and conducted experiments in the attic of a boardinghouse. He did this at night and on weekends while he continued to earn his living as a teacher.

Bell was particularly interested in developing a harmonic telegraph. This was a device he hoped would carry several messages over one wire at the same time. His goal became easier when he received the financial backing of the wealthy parents of two of his students. One was Gardiner Hubbard, the father of Mabel, whom Bell married. The other was Thomas Sanders, whose son was also one of Bell's students.

With funds available, Bell was able to hire an assistant, Thomas Watson. The two worked on Bell's ideas for several years. Sometimes, when they made small gains, they danced and made so much noise that a man occupying rooms directly beneath them complained to the landlady. The landlady on several occasions threatened to evict them if they did not keep the noise down.

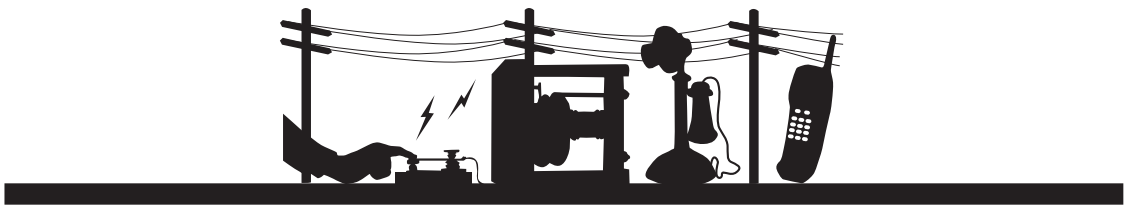
One day Bell and Watson were working on a new transmitter. Bell was in one room of the attic and Watson in another. Suddenly, Bell spilled battery acid all over his trousers. Alarmed, he cried out: "Mr. Watson, come here. I want you." Watson immediately entered the room and excitedly announced that he had heard Bell's voice come through the receiver in the other room. In that instance, quite by accident, the telephone came into existence.

The cellular telephone, which has revolutionized communication in recent years. It is now possible to make telephone calls from any location.

Developments in telephone technology moved rapidly. Bell himself made the first long-distance call from New York to Chicago in 1892. This was followed by the first coast-to-coast call in 1915. And in 1923, the first overseas call was made between New York City and England. The telephone had come of age.

Today we have portable phones that we can carry from room to room or take outdoors with us. In addition, many people have wireless or cellular phones that allow them to make calls from their automobile or any other place. (Japan introduced the cellular phone in 1979, and cellular service in the United States went into operation in 1983.)

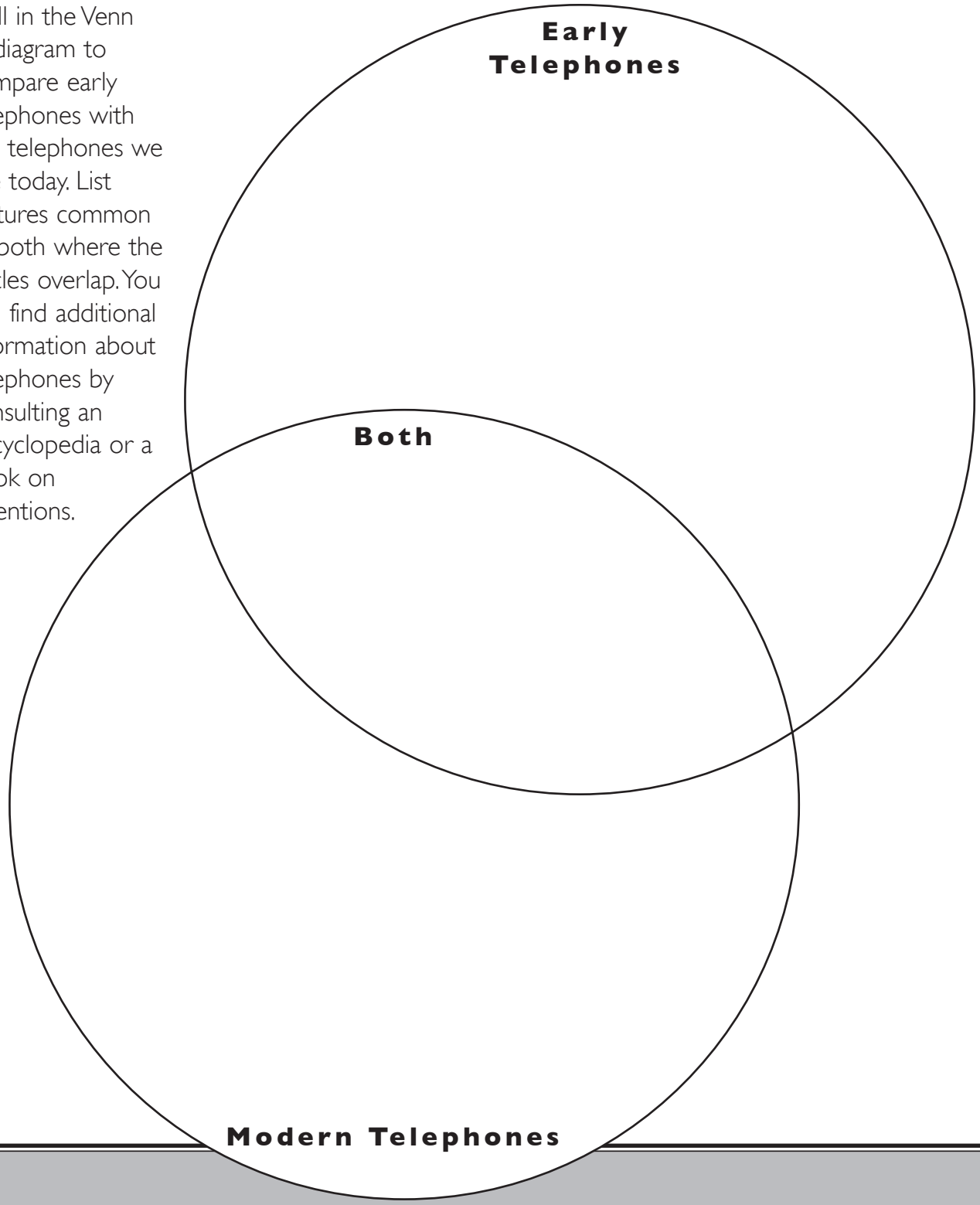
What about the future? Video telephones, which enable users to see as well as hear persons they call, have already been invented. It will only be a matter of time before they find their way into the American home.

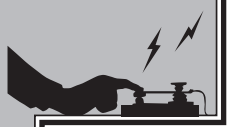


Name _____ *Date* _____

Fill In a Venn Diagram

Fill in the Venn diagram to compare early telephones with the telephones we use today. List features common to both where the circles overlap. You can find additional information about telephones by consulting an encyclopedia or a book on inventions.





Name _____ *Date* _____

Write an Article for *The Washington Word*

Imagine yourself a reporter for *The Washington Word* at the time Samuel F. B. Morse sent his historic message from Washington, D.C., to Baltimore, Maryland. On the lines provided, write a short article that would go along with the headlines.

Be sure to include in your article answers to the five W questions: Who? What? When? Where? and Why?

The Washington Word

***** **May 25, 1844** *****

FIRST MESSAGE SENT BY TELEGRAPH

Forty Miles Covered in an Instant

Name _____ *Date* _____

Create a String Telephone

You can do a lot of different things with a piece of string. You can fly a kite, make a yo-yo go up and down, or bring a puppet to life. But did you know you can also talk through a piece of string? Were you aware that you can use a piece of string and several cups to make a simple telephone?

You can imagine how excited Alexander Graham Bell was the first time he heard his voice over the telephone? By making a simple telephone of string, you can experience some of that excitement and gain a better understanding of how sound vibrations travel at the same time.

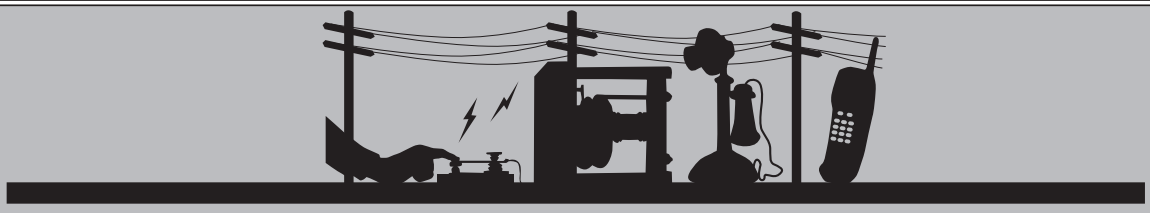
To make your telephone, here is what you need:

1. A piece of thin string 10–20 feet in length
2. Two paper or polystyrene cups, at least five ounces in size
3. A pin
4. Two small pieces of transparent tape

Here is what you do:

1. Make a pinhole in the bottom of each paper cup.
2. Thread one end of the string through the hole in each cup. Tie a knot inside each cup and secure with a piece of tape.
3. Ask a friend or family member to take one end of the telephone to another room. Hold the string taut and talk into the cup on your end. Your partner should be able to use his or her cup as a receiver and hear what you are saying. Use your cup as a receiver when your partner talks to you.

As a variation on the two-mouthpiece/receiver string telephone, try making a three-way telephone by attaching another string and cup to the string you are already using. Report any differences you observe in performance.



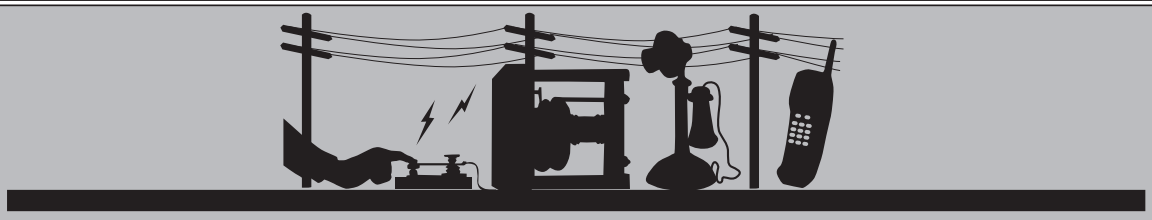
Name _____ *Date* _____

Name Those Synonyms

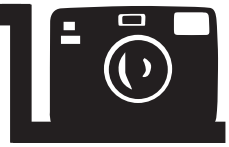
You know that a synonym is a word that has the same meaning as another word.

Here are 20 words taken from the chapter you have just read. On the lines provided, write two synonyms for each.

1. brief (adj) _____ _____
2. famous (adj) _____ _____
3. departed (v) _____ _____
4. neglected (v) _____ _____
5. device (n) _____ _____
6. modern (adj) _____ _____
7. portrait (n) _____ _____
8. demonstrate (v) _____ _____
9. wealthy (adj) _____ _____
10. method (n) _____ _____
11. major (adj) _____ _____
12. sometimes (adv) _____ _____
13. complained (v) _____ _____
14. announced (v) _____ _____
15. founded (v) _____ _____
16. alarmed (v) _____ _____
17. immediately (adv) _____ _____
18. assisted (v) _____ _____
19. transmitted (v) _____ _____
20. message (n) _____ _____



CHAPTER 5



Photography

If you thumb through an old family album or observe early photographs in a museum, you will notice that the people in the pictures sometimes look strange. Many, in fact, appear to be in the throes of agony. They may be grimacing or staring wide-eyed straight ahead. Their fists may be clenched and their bodies rigid. Most look very unhappy and anxious for whatever it is that is tormenting them to end.

Were these people being subjected to some kind of terrifying ordeal? Had they all seen ghosts and were too stunned to move? No. Their images were recorded for history as they posed for early photographs, an experience that could best be described as uncomfortable.

Early cameras did not have a shutter that opened to let in light. The photographer simply removed a cap covering the lens to permit light to reach a photographic plate at the rear of the camera. Exposure time was at first lengthy, ranging from 15 minutes to an hour. During this period, the person whose picture was being taken had to sit absolutely still. Special chairs with clamps were used to prevent any movement of the head or hands. Fortunately, exposure time was slowly reduced to less than a minute as improvements in cameras came about. Still, a period of almost a minute was a long time for someone to sit still, especially if that person was a child.

The idea for the camera came from an earlier device used by artists called a camera obscura. *Camera obscura* is a Latin term meaning "dark box or room." A camera obscura was a dark room with a pinhole in one wall to let in light. As the light passed through the hole, it created an upside-down image on a screen or opposite wall. The image created might be that of a tree or building, or even a person—whatever was outside the wall in which the hole had been made. The artist then sketched around the image to complete a very accurate drawing.

The camera obscura described above was used as early as the eleventh century. It remained virtually unchanged until the middle of the sixteenth century, when an Italian artist named Giovanni della Porta made a remarkable discovery. By inserting a lens in the pinhole, della Porta found that the size of the image projected on the opposite wall was greatly reduced. It was also brighter and clearer.

The way was now open for the camera to evolve. Artists began to carry portable camera obscuras everywhere they went. In time, camera obscuras were

being made from small boxes equipped with a focusing lens. A focusing lens made it possible for the artist to see the picture in the box from the outside.

One step remained for the camera obscura to become a real camera. That was to find a way to capture the image produced through the lens. After a number of different plates (forerunners to film) and chemicals were tried, the first real photograph was made in 1824. Joseph Nicéphore Niépce, a French printer and inventor, succeeded in taking a picture of the view from the window of his home in Saint-Loup-de-Varennes. It was not a very good picture, but the images of rooftops, buildings, and chimneys were unmistakable.

A woman poses for one of the first daguerreotypes to be taken. This photograph dates from about 1845.

Niépce's process was improved upon in 1837 by Louis Daguerre, a fellow Frenchman. Daguerre produced his photograph on a thin copper plate coated with silver. These photographs came to be known as daguerreotypes. Daguerreotypes remained popular in the United States until the 1860s, and many fine examples still exist today.

About the same time that Daguerre was perfecting his method of making photographs, an Englishman named William Henry Fox Talbot invented a light-sensitive paper from which a negative could be made. Eventually, glass negatives replaced those made from paper. These first steps made it possible to make more than one copy of a picture.

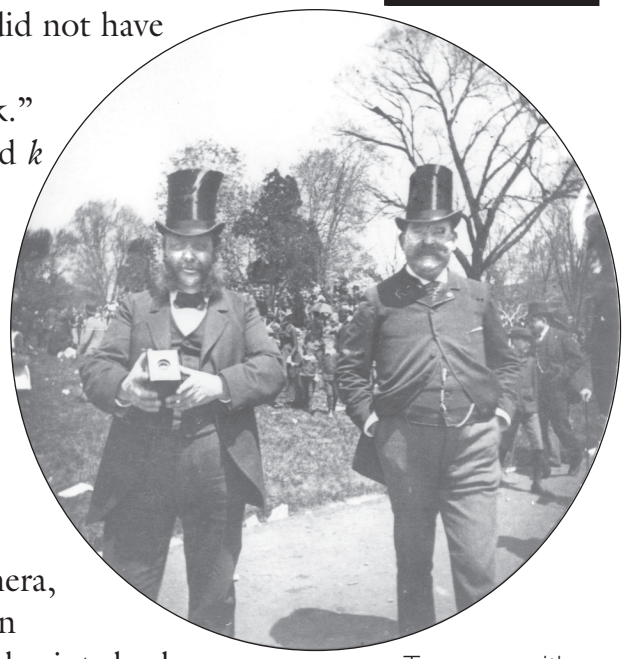
Until the late 1880s nearly all photographers were professionals. Photographic equipment was expensive and beyond the understanding of the average person. Then in 1888 an American inventor named George Eastman introduced two inventions that made photography practical for everyone. These inventions were roll film and the Kodak camera.

Eastman called his roll film American Film. It consisted of a long strip of paper that was coated with a clear, gelatin emulsion and wound on rollers. After each picture was made, the photographer turned the rollers to expose another part of the film. When the entire roll was used up, the paper backing was removed, leaving a strip of negatives from which to make pictures. This early kind of roll film was replaced in 1889 by celluloid film. Since the

celluloid was transparent, the light-sensitive gelatin did not have to be stripped away to form a negative.

Eastman called his small box camera "the Kodak." *Kodak* was a word he made up because he considered *k* a letter that people took notice of. The Kodak could not have been any simpler to operate. The user pointed the camera, pulled a cord to open and lock the shutter, pressed a button, and then turned a key to advance the film.

Early roll film was sealed inside the camera and could be removed only by the manufacturer. When the owner used up the roll, he or she shipped it—along with $10—to the Eastman Company in Rochester, New York. The company opened the camera, removed the film, and developed the pictures. It then inserted a new roll of film and mailed the camera and prints back to the owner. Eastman's motto was: "You press the button, we do the rest."



Two men with a Kodak camera take pictures on the White House lawn in 1888. George Eastman had come out with the Kodak a short time before.

The Kodak camera sold for $25. In its first year on the market, more than 13,000 were purchased. One of the buyers was Alexander III, the Czar of Russia. In 1895, Eastman came out with the pocket Kodak, in which owners could insert and remove the film themselves. In 1900, he introduced the popular Brownie camera, which sold for $1.

Thanks to George Eastman's contributions, progress in photography moved steadily ahead. The Leica, or 35-millimeter camera, was introduced in 1925. It made possible much clearer pictures and needed less light than earlier cameras. Four years later, flashbulbs appeared, although they were not widely used until the 1940s. Flashbulbs made it possible to take pictures at incredibly fast speeds. During World War II, another kind of flash called electronic flash or speedlight was perfected. With speedlight, pictures could be taken at speeds of 1/10,000 of a second. Finally, color film was invented in 1935 and was first marketed by the Eastman Kodak Company in 1936.

This ad from about 1900 seeks to convince buyers that the Brownie camera is so simple to use that even a child can manage it.

Even before George Eastman came out with roll film and the Kodak camera, photography had blossomed into a means of communication. *Photojournalism*, or using pictures to report on news and events, began on December 2, 1873. On that date, the *Daily Graphic*, a New York City newspaper, published the first photograph to appear in a newspaper. It was an insignificant picture of a building, but it marked the beginning of a new era in photography. Soon other newspapers followed suit and began printing photographs along with their news stories.

An undated advertisement poster for the "Kodak Girl" encourages Americans to take a Kodak on outings to the beach and elsewhere.

Reformers such as Jacob Riis and Lewis Hine used photographs to bring about social change. Their pictures exposing the evils of slums and child labor shocked people everywhere. Other photographers documented the hardships of the Great Depression that began in 1929 and continued until the beginning of World War II. Their pictures of soup kitchens and unemployment lines tell of the suffering experienced by millions of Americans during those terrible years.

During the Depression, a new form of photojournalism called the photo essay appeared. A photo essay tells a story with just pictures and captions. Henry Luce, a wealthy publisher, introduced the photo essay in his first issue of *Life* magazine in 1936. Many of the pictures appearing in history textbooks depicting events that occurred after this date were taken by *Life* photographers.

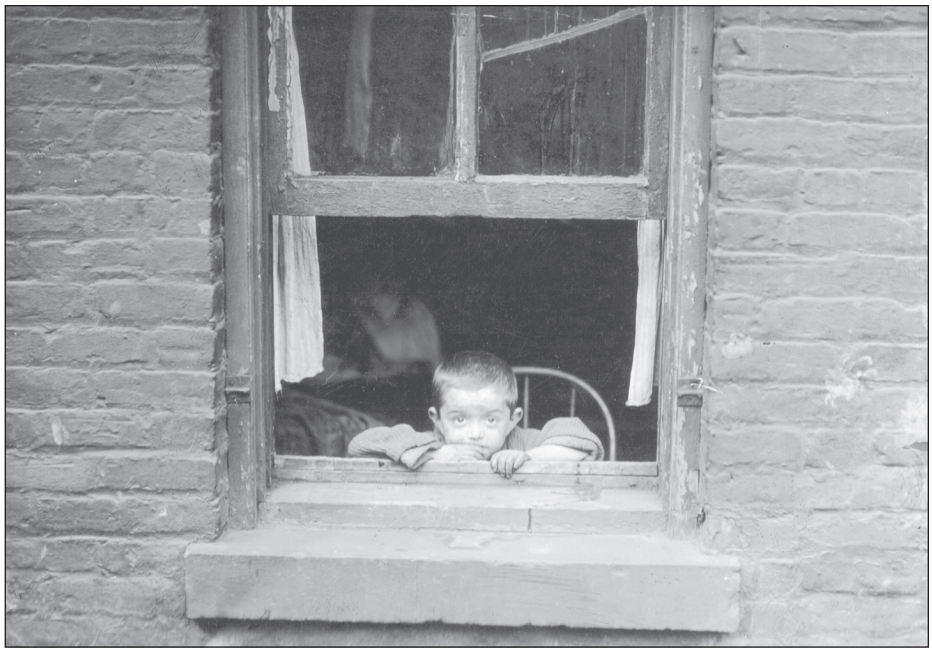
Photography as a means of communication is not limited to social and historical events. Photographs provide us with scientific facts about the universe in which we live: the Earth, the oceans, the heavens, and outer space. They give us special pictures called X-rays that enable doctors to "see" inside human bodies. They are used to make maps and to sell commercial products. Their uses and benefits are boundless.

Name _____ *Date* _____

Interpret a Picture

The beginning of photojournalism proved to many that "a picture is worth a thousand words." A photograph, with or without a caption, can go a long way in telling a story all by itself.

Look at the picture of the young boy at a window in the slum area of New York City near the turn of the 19th century. What do you suppose the child is thinking? Is he sad? Is he frightened? What does the picture say about the conditions under which he is forced to live? On the lines, write your interpretation of what the picture reveals to the viewer.



Name _____ *Date* _____

Use Context Clues to Complete Sentences

Fill in the blanks in the sentences using the words from the word box.

amateur	film	produced
artists	mere	reduced
beginnings	pioneer	smile
cameras	posing	sold
comfortable	process	transformed

The development of the camera was a _____ that took many years. It had its _____ in the *camera obscura*, which was used by _____ to create exact drawings. It then slowly evolved into the sophisticated _____ that we have today.

A _____ in the field of photography was George Eastman. Thanks to his roll _____ and Kodak camera, he helped "remove the grimace and put the _____ in the snapshot." The Kodak _____ the exposure time for a picture to one $\frac{1}{25}$ of a second, making those _____ for a photograph much more _____.

Eastman _____ his first Kodak camera for $25. He later _____ a Kodak that marketed for $5 and a Brownie that sold for a _____ dollar. In a few short years, he _____ photography from a professional pursuit to one an _____ could handle easily.

Name _____ *Date* _____

Make a Pinhole Camera

To understand how a simple camera works, you can make what is called a pinhole camera using a few simple materials.

Here is what you will need:

1. An empty tin can or a small cardboard box
2. Wax paper or tissue paper
3. Transparent tape
4. A hammer
5. A small nail or pin

Here is what you do:

If you use a tin can:

1. Make a small nail hole in the closed end of the can.
2. Tape waxed paper or tightly stretched tissue paper over the open end.
3. Point the end with the hole in it at a bright object. The image you see on the waxed paper or tissue paper will be inverted (upside-down) as it would be on film in a real camera.

If you use a small cardboard box:

1. Use the pin to make a hole on one end of the box.
2. Cut out the other end and tape waxed paper or tissue paper in its place.
3. Follow the same procedure for Step 3 that you would use with a tin can.

Name _____ *Date* _____

Write a Letter

Imagine that you have left a photographer's studio sometime in the 1850s after a family photograph has been taken. Inasmuch as these are the days when the daguerreotype process of picture-taking is still being used, the adventure was not altogether a happy one. Neither you nor any member of your family is in the best of moods as you climb into the buckboard and head back to the farm. Exposure time was extremely long, the photographer was gruff and bossy, your younger brothers and sisters were fussy and uncooperative, and your exasperated parents wish they had forgotten the whole thing.

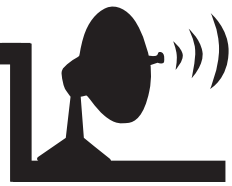
On the lines, write a letter to a friend describing your experience.

Date _____

Dear _____,

Your friend,

_____



CHAPTER 6

Radio

For every new development in communication, there is a "first" that will forever be associated with it. Samuel F. B. Morse's "What hath God wrought?" was the first message transmitted by telegraph. Alexander Graham Bell's "Mr. Watson, come here. I want you." marked the first time the human voice was sent over a telephone wire. And so it goes.

Some sources maintain that the first radio broadcast involving more than signals was heard on Christmas Eve, 1906. Ship radio operators at sea were startled to suddenly hear a man speaking. They were further stunned when they heard a woman singing, accompanied by a violin. Then a voice said, "If you have heard this program, write to R. A. Fessenden at Brant Rock." (Reginald A. Fessenden was an American physicist.). From such humble beginnings, the era of radio began.

Eager children gather around an early radio in an undated photograph. People of all ages were captivated by the new entertainment medium.

In our modern age of television and other advanced means of communication and entertainment, you might find it difficult to understand and appreciate the excitement surrounding the advent of radio. But it was exciting. For the first time, people could hear the news rather than read about it. They could listen to sporting events and enjoy both popular and classical music. They could smile at the latest gossip and, if they were so inclined, get out of bed before the sun rose and participate in wake-up exercises. Even programs that were boring had an audience. Just the magic of words and sounds coming through the air was enough to provide entertainment.

How enthralled were Americans with radio? A radio program broadcast in 1938 dramatically shows how seriously people took the new medium. Orson Welles, a director and producer, caused a panic when he broadcast a play about an imaginary Martian invasion of the United States. Many listeners who tuned in thought they were hearing a news bulletin. The sounds of explosions in the background caused some to call police or military bases. Others packed a few possessions in their cars and fled in terror. Some time passed before many Americans realized what had actually happened.

Orson Welles broadcasting in 1938. His program about a Martian invasion caused panic among listeners, many of whom took the imaginary attack as real.

Radio grew out of wireless telegraphy. Guglielmo Marconi, a

young Italian, began experimenting with sending dot-and-dash messages without the aid of wires. Using knowledge of electric waves discovered earlier by others, in 1894 Marconi began sending signals to a receiver in the garden of his father's estate. Soon he was able to send signals a distance of eight miles. When the Italian government showed no interest in his experiments, he went to England. Real success came in 1899 when he sent a dot-and-dash message across the English Channel. Two years later, he achieved fame by sending a message across the Atlantic Ocean.

Marconi's wireless telegraph could send only messages in code. It could not transmit the human voice or other sounds. This did not become possible until the appearance of the vacuum tube in 1904. The tube was invented by an English electrical engineer named John Ambrose Fleming and improved upon by Lee De Forest, an American inventor. Their contributions made possible the surprising 1906 broadcast that was mentioned at the beginning of the chapter.

England's Duke of York with a "portable" radio about 1923. Note the large loudspeaker horn typical of radios at the time.

Matters moved quickly after the vacuum tube was invented. Speech was transmitted across the Atlantic in 1915, and, in 1917, a new radio receiver was developed that eliminated weak and distorted signals. This receiver was called a superheterodyne and was the invention of Major Edwin Armstrong of the U.S. Army.

The first public radio broadcast occurred on November 2, 1920. The Westinghouse Electric & Manufacturing Company, using the call letters KDKA, broadcast the results of the 1920 presidential election from its plant in Pittsburgh, Pennsylvania. Public radio took off from there; eighteen months later there were 230 radio stations in operation across the country.

Even before that first historic broadcast, Dr. Frank Conrad, Westinghouse's chief engineer, had begun twice-weekly broadcasts that were received by thousands of "ham" (amateur) operators. In the summer of 1920, Dr. Conrad set up a home broadcasting station above his garage in East Pittsburgh. Every Wednesday and Saturday he sent out two-hour broadcasts consisting of news and music. Ham operators, who during that summer were the only people owning anything resembling radio sets, were delighted. Hunched over their homemade receivers, consisting in part of copper wire wrapped around oatmeal boxes, they pleaded for more.

After station KDKA had shown the way, Americans lined up to buy receiving sets. More than 3 million homes had radios by 1922. By 1930 the number had increased to 13.7 million. Radio was America's favorite form of home entertainment through the 1940s and into the early 1950s. Even after television become popular in the 1950s, there were still some 85 million radios in American homes and more than 3,000 broadcasting stations.

Early receivers were called crystal sets and operated on batteries. Their signal was so weak that listeners had to wear earphones to hear. After a few years, loudspeaker horns replaced earphones, and radios were easier to use.

A scene from a movie provides an excellent shot of an early console radio. Console radios served as both entertainment devices and pieces of furniture.

In the 1930s, sets were introduced that had both the antenna and the loudspeaker built in. At the same time, large console models that sat on the floor and were actually considered a piece of furniture appeared. As demand increased, sets became sleeker and more attractive, and they even offered something extra to the buyer—some made during the Prohibition era came complete with a hiding place for alcohol!

As more Americans bought radios, programs increased in variety. Boxing's first heavyweight championship fight was broadcast in 1921, followed in 1922 by the World Series between the New York Giants and the New York Yankees. In addition to sporting events, there was a parade of singers, musicians, and comedians to keep listeners on the edge of their seats. America simply fell in love with the radio. Families gathered around the set after dinner each evening to tune in to their favorite programs. The radio was especially important to shut-ins and the elderly, who might otherwise have fallen victim to loneliness and boredom without it.

Early radio was unique in that listeners could use their imaginations. They could make the villain in a drama as villainous as they chose and the young lady in distress as sweet as the idealized girl next door. They could visualize all heroes as stunningly handsome and wearing white hats. They were free to create their own images of what they "saw" on a radio program.

Radio plays were broadcast live and depended on sound-effects technicians to make them realistic. A good sound-effects person could simulate any sound. The noise made by a galloping horse could be created by

Broadcasting live over station WJZ, Newark, New Jersey, in the 1920s. By that time, a variety of entertaining events could be enjoyed by radio listeners at home.

pounding halved coconut shells on a tray of sand. The crackling sound of a raging fire could be produced by crumpling cellophane near the microphone. As actors read their lines, sound-effects persons stood to one side creating the necessary sounds to go along with each scene.

New developments in radio came rapidly. In 1933, Edwin Armstrong, who had earlier invented an improved receiver, constructed the first FM station in the United States. FM (frequency modulation) eliminated static caused by electrical storms and made reception much clearer. A short time later the first portable sets were introduced, and the radio started traveling from room to room and even to the beach. Radios were also installed in automobiles, some as early as in 1929. In 1948 the invention of the transistor made possible small battery-operated transistor radios that later became popular.

The importance of radio, however, goes far beyond providing a means of entertainment. Ships rely on radio to keep in touch with one another and with installations on shore. Airplanes use radios to maintain contact with airports on the ground. Police departments, trucking companies, and taxis use two-way radios as a means of communication. Even astronauts use radios to maintain contact with scientists on Earth.

Radio has not been confined to carrying voices and other sounds. Radio detection and ranging, known by the acronym RADAR, came into use at the beginning of World War II as a means of detecting enemy aircraft. British scientists learned that radio waves sent out from tall towers would bounce off planes and echo back as blips on a screen. These blips not only warned British military personnel of the approach of German planes, but also indicated how fast the aircraft were traveling and from which direction. Without radar the British might not have won the air battle over Britain.

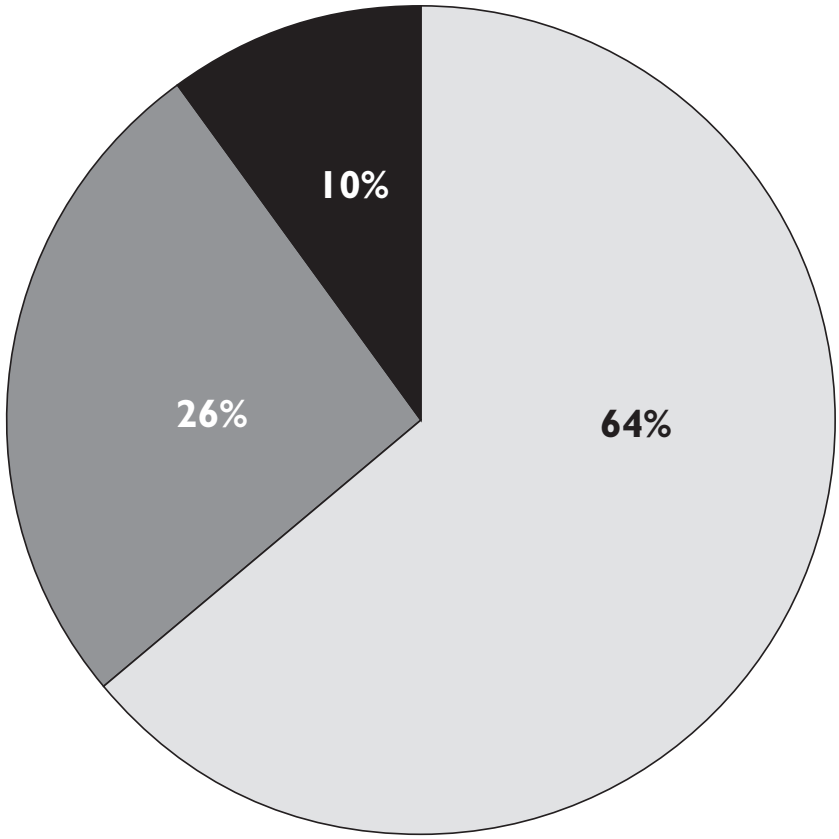
Today, radar tracks storms, guides ships, and keeps airplanes on designated paths to avoid midair collisions. It can guide a missile to strike a target or help a police officer nab a speeding driver. Its uses are many.

Name _____ *Date* _____

Solve a Radio Pie Chart

When radio stations began to spring up in the early 1920s, a man named Charles Merz conducted a survey. Merz was interested in the total number of hours 10 leading stations devoted to talk, popular music, and "serious" music in one week. After some study, he arrived at a total of 294 hours and broke these down into percentages for each of the three categories.

Study the pie chart. Then, at the bottom of the page, compute and write in the number of hours devoted to each category by the 10 combined stations.



- Talk 10%
- Serious Music 26%
- Popular Music 64%

How many hours were devoted to:

a. popular music _____

b. serious music _____

c. talk _____

Name _____ *Date* _____

Write a Dialogue

Create a dialogue between an elderly person reminiscing about the days of early radio and a present-day student praising the wonders of television. Have both give reasons why they consider his or her particular medium the best.

Name _____ *Date* _____

Compare Radio Then and Now

Go back and read the paragraphs in Chapter 6 dealing with early radio programs. Then answer the questions.

1. Are there any similarities between radio then and now?

_____

_____

_____

_____

2. How do programs offered by radio stations today differ from those in the past?

_____

_____

_____

_____

3. Do you think you would have enjoyed radio as it was in the 1920s and 1930s? Why or why not?

_____

_____

_____

_____

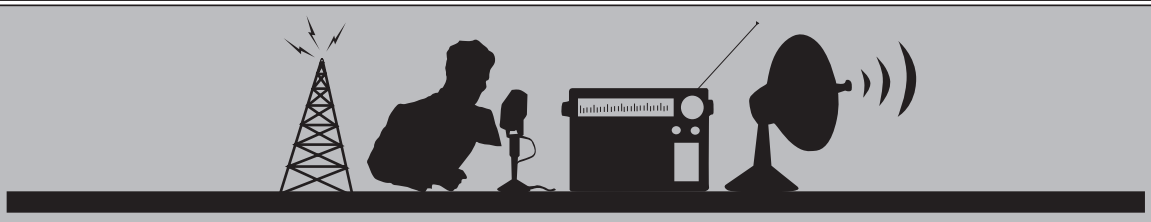
4. Can you think of any advantage(s) early radio had over television?

_____

_____

_____

_____



Name _____ *Date* _____

Make False Statements True

All of these statements are false. Change the word(s) in italics to make them true. Write the replacement word(s) on the lines following the statements.

1. *Dr. Frank Conrad* was a director and producer who frightened Americans with his 1938 radio play about an invasion from Mars. _____
2. Wireless telegraphy (radio) was invented by *Alexander Graham Bell*. _____
3. John Ambrose Fleming invented the *portable radio*. _____
4. Major Edwin Armstrong invented an improved radio receiver called *radar* in 1917. _____
5. KDKA, the first radio station, broadcast out of *New York City*. _____
6. The first public radio broadcast occurred in *1915*. _____
7. Guglielmo Marconi went to *France* when the Italian government showed no interest in his experiments. _____
8. *Loudspeaker horns* were used to hear with crystal sets. _____
9. Crystal sets operated off *electricity*. _____
10. The advent of frequency modulation (FM) helped eliminate static caused by *airplanes*. _____
11. The transistor was invented in *1933*. _____
12. Radar was first used in *World War I*. _____
13. *Professional* radio operators are called "hams." _____

CHAPTER 7

Motion Pictures

Imagine you are living in the year 1894. As you walk down the street of a typical American city, you notice a sign advertising peep shows. Curious because of what your cousin Billy has told you, you stop and find yourself at the doorway of a Penny Arcade. The peep show, or "flicker," available that day for viewers to watch is entitled "Fred Ott's Sneeze." Inasmuch as you have exactly one penny in your pocket, you decide it just might be worth spending it to learn if Billy was telling the truth about pictures that "moved."

This is your first visit to a Penny Arcade. You enter cautiously and see people standing before boxlike apparatuses and turning cranks. They are smiling and shaking their heads. You approach a machine yourself and drop in your penny. Breathlessly, you place an eye over a peephole in the box and begin to turn the crank. You are amazed! Before your very eyes is the image of a man sneezing. But the man is doing more than simply sneezing. His head and his right hand holding a handkerchief are moving. You are actually seeing moving image on film! Disappointed that the scene is over in about 20 seconds, you wish you had another penny to watch it again.

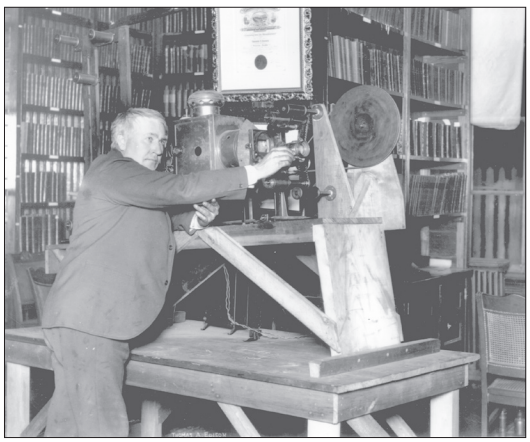
A young lady watches a "flicker" by turning the handle of a kinetoscope. By the mid-1890s, kinetograph parlors or Penny Arcades had spread across the country.

Most sources say that "Fred Ott's Sneeze" was the first simple movie produced. It was made by Thomas Edison, who had previously given the world such notable inventions as the phonograph and the electric light. Edison made the short film at his studio in West Orange, New Jersey. The studio was constructed of pine and covered with tar paper, and it was built to be light enough so that it could be turned to follow the sun. In this crude building, Edison made other short films showing boxers sparring and couples dancing.

The motion picture had its beginning with Edison's invention of the kinetograph. The kinetograph was a camera that made a series of photographs using flexible celluloid film. To make the pictures appear to move, Edison invented a device called a kinetoscope. This was the box you would have peeped into had you visited a Penny Arcade or Kinetoscope Parlor in the 1890s. Inside the kinetoscope a line of film moved along a series of spools as the user turned a crank. Other than "Fred Ott's Sneeze," early kinetoscope

offerings included the likes of "Surf at Dover" and "Beavers at Play." As silly as these early "flickers" appear today, they thrilled people at the time.

In 1894, the Edison Kinetoscope Company began shipping kinetoscopes nationwide. Enthusiasm ran high as people rushed to the Penny Arcades in droves. Inventors, sensing the mood of the public, immediately began looking for a way to project the small images onto a large screen. They succeeded in 1895 with a projector called the vitascope.



Thomas A. Edison experimenting with the first motion picture machine, the vitascope. The vitascope was invented in 1895 by Thomas Arnet.

Invented in 1895 by Thomas Armat, the vitascope was used by Thomas Edison to show the first-ever film to a theater audience in the United States. The date was April 23, 1896, and the scene was the Koster and Bial's Music Hall in New York City. The audience was thrilled as the larger-than-life pictures appeared on the screen, even though they consisted of a hodgepodge that included boxers, dancing girls, and ocean waves breaking on a beach. The latter scene seemed so realistic to viewers sitting in the front rows that they ran to avoid getting wet!

The vitascope and other projectors brought an end to the peep show. In its place came the motion picture theater. The first such theater opened in 1902 in Los Angeles, California, and charged 10¢ for admission. Then, in 1905, a real estate salesman named Harry Davis opened a small theater in a vacant storeroom and started charging only 5¢ for a ticket. Davis's theater was the first nickelodeon in America. That same year some 300 nickelodeons (so-called because of the 5¢ admission price) opened up in New York City alone.

By 1907 more than 5,000 nickelodeons had opened up throughout the country. Three years later, the number had increased to 10,000, with weekly audiences of 10 million people. Companies turned out enough 10–15 minute films to enable theaters to offer a new show every day. From "Fred Ott's Sneeze," movie producers branched out into slapstick comedy, Broadway plays, and adventure series. Theatergoers thrilled at *The Great Train Robbery*, the first American film to actually tell a story. Although it lasted a mere eight minutes, it gave the public a taste of what was to come.

Early films had such simple plots that subtitles or captions were not needed to follow them. As such, they were a major form of cheap entertainment for immigrants from southern and eastern Europe, nearly

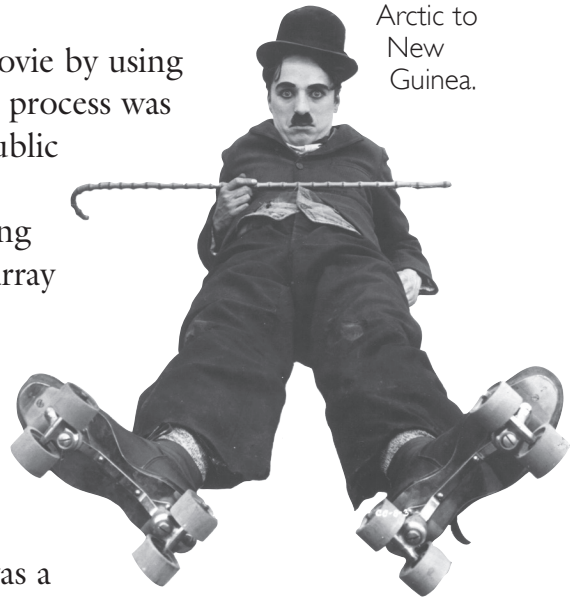
all of whom understood no English. When subtitles started to be added in 1912, the writing on the screen helped immigrants master a few words of the strange language of their adopted land.

Moviegoers today would surely chuckle at what passed for entertainment at a nickelodeon. In addition to subtitles on the screen, a pianist to the side played music throughout the film. If the scene being projected was one of action, the pianist banged away in thunderous tones to match the tempo. If the scene was one of romance, the tune coming from the piano might be soft and melodious.

A unique feature of early films was the projection of slides onto the screen while reels were being changed. Such slides passed on information and attempted to teach certain social graces to those in attendance. Ladies were asked to "kindly remove your hats," while men were cautioned not to smoke because "it annoys the ladies." One common slide read, "Please Read the Titles to Yourself. Loud Reading Annoys Your Neighbors." Another was designed to protect young ladies from flirts who might be pestering them. It showed a picture of a young man tickling a young lady under the chin and read, "If Annoyed When Here Please Tell the Management."

Motion pictures became an even greater means of communication when newsreels began in 1910. A newsreel was a short film about current events. It summed up what had happened on the national and international scenes in previous weeks, including sporting and other events. Newsreels lasted until television came on the scene in the early 1950s.

In 1914, Thomas Edison made the first "talking" movie by using his phonograph and movie camera at the same time. The process was cumbersome, however, and failed to catch on. But the public didn't seem to mind the lack of sound; they had such movie spectaculars as *Quo Vadis?*, which featured a thrilling chariot race, to keep them entertained. Also, an endless array of comedies kept audiences laughing through the 1910s. Comedian Charlie Chaplin made 34 films in 34 weeks in 1914. Can you imagine that? One film was said to have been completed in less than an hour!



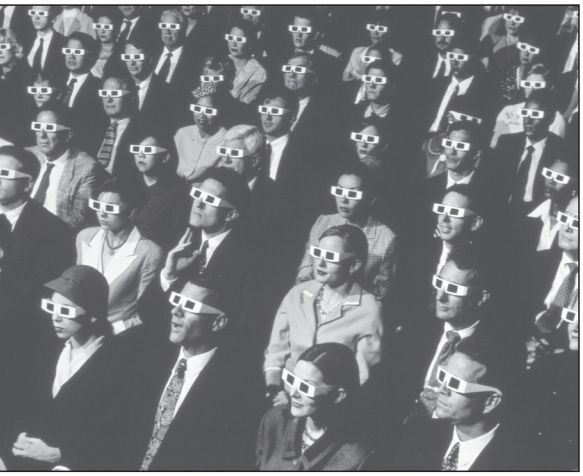
Comedian Charlie Chaplin in his role as the gentleman tramp. Chaplin's films were popular everywhere from the Arctic to New Guinea.

The first film with real sound came out in 1927. Singer Al Jolson sang three songs and the actors spoke only a few words of dialogue in *The Jazz Singer*. But it was a

beginning. With overwhelming public response, the first all-talking picture, *Lights of New York*, was produced the following year. Theater owners quickly found that the worst sound movie sold more tickets than the best of the silent variety. Almost overnight the 32-year era of the silent film came to an end.

With sound and then color added, the film industry boomed in the 1930s. Movies were especially popular during the years of the Great Depression. For only 10¢, people could momentarily forget their troubles and enjoy a double feature in a comfortable theater. Some 60 percent of all Americans attended the movies every week during those troubled times.

Movies continued to enjoy enormous success through the 1940s and into the early 1950s. Then stiff competition in the form of television appeared. As families began to purchase televisions, they stopped going to the movies. In desperation, the motion picture industry sought new ways to draw people back to the theaters.



Wearing special colored glasses, a theater audience watches a three-dimensional (3-D) film. 3-D films never really caught on with moviegoers.

One of the first innovations tried by the film industry was 3-D, or three-dimensional, films. Wearing special glasses, audiences saw three-sided figures rather than flat pictures. Theatergoers thrilled and screamed as they dodged arrows, striking rattlesnakes, and ping-pong balls that seemed to jump off the screen at them. Three-dimensional films enjoyed a brief popularity, but they never really caught on. People complained that the colored glasses required to watch a film were too uncomfortable to wear.

The answer the movie industry was looking for came in the form of Cinemascope. This process made use of a wide-angle lens that projected a wide, slightly curved picture on the screen. It did not require three separate cameras as did Cinerama, and it could be installed in any theater with no loss of seats. Cinemascope led to the production of longer, spectacular films that helped lure television watchers back to the theaters.

The motion picture industry passed through some rocky times to get to where it is today. It survived first the challenge of radio and then of television. When its very existence was threatened, it had to come up with new ideas and techniques just to stay alive. How well has it succeeded? Such blockbuster films in modern times as *Star Wars*, *E.T.*, and *Titanic* attest to the fact that it has succeeded very well.

Name _____ *Date* _____

Test Your Critical Thinking Skills

Using the lines provided, write your best answers to the following questions.

1. When sound brought an end to silent movies, many silent film stars suddenly found themselves without employment. Can you think of reasons why this might have happened?

_____

_____

_____

_____

2. In your opinion, did it require more or less talent to act in a silent film than in one with sound? Give reasons why you feel as you do.

_____

_____

_____

3. Which do you think people found more exciting when it first appeared: the movies or television? Why?

_____

_____

_____

_____

4. As you know, movies today are rated to protect young people from objectionable language and scenes. Do you agree or disagree with the current rating system? Is it too strict? Too lenient? Write your opinions below.

_____

_____

_____

_____

Name _____ *Date* _____

Solve Some Movie Math Problems

At right are several word problems having to do with the movies. Solve each in the space provided and write the answer on the appropriate line.

1. Ten times as many people attended movies each week in 1929 as in 1910. If weekly attendance in 1929 averaged 100 million, how many paid admissions were there each week in 1910? _____ paid admissions

2. The first complete talking movie, *Lights of New York*, cost $23,000 to make. In contrast, *Titanic*, which was produced in 1997, cost $200,000,000 before it was completed.
   a. How much more did Titanic cost to make?
   $_____ more

   b. How many times greater was *Titanic*'s cost. (Round to the nearest hundred.) _____ times greater

3. The old Roxy Theater in New York City had a seating capacity of 6,214. If it was open today and one-half of the seats were filled for one showing of a movie at an admission price of $5.75, how much money would the theater take in?
   The theater would take in $_____.

Name _____ *Date* _____

Test Your Knowledge of New Jersey

Many people probably think the movie industry has always been centered in Hollywood, California. Most would be surprised to learn—as you have—that it had its humble beginnings in West Orange, New Jersey, in a crude tar-paper studio constructed by Thomas Edison.

How familiar are you with New Jersey? Can you pinpoint its exact location on a map or name its leading cities? Do you know which states border it?

You can answer these and the other fill-in-the-blank questions by consulting an encyclopedia.

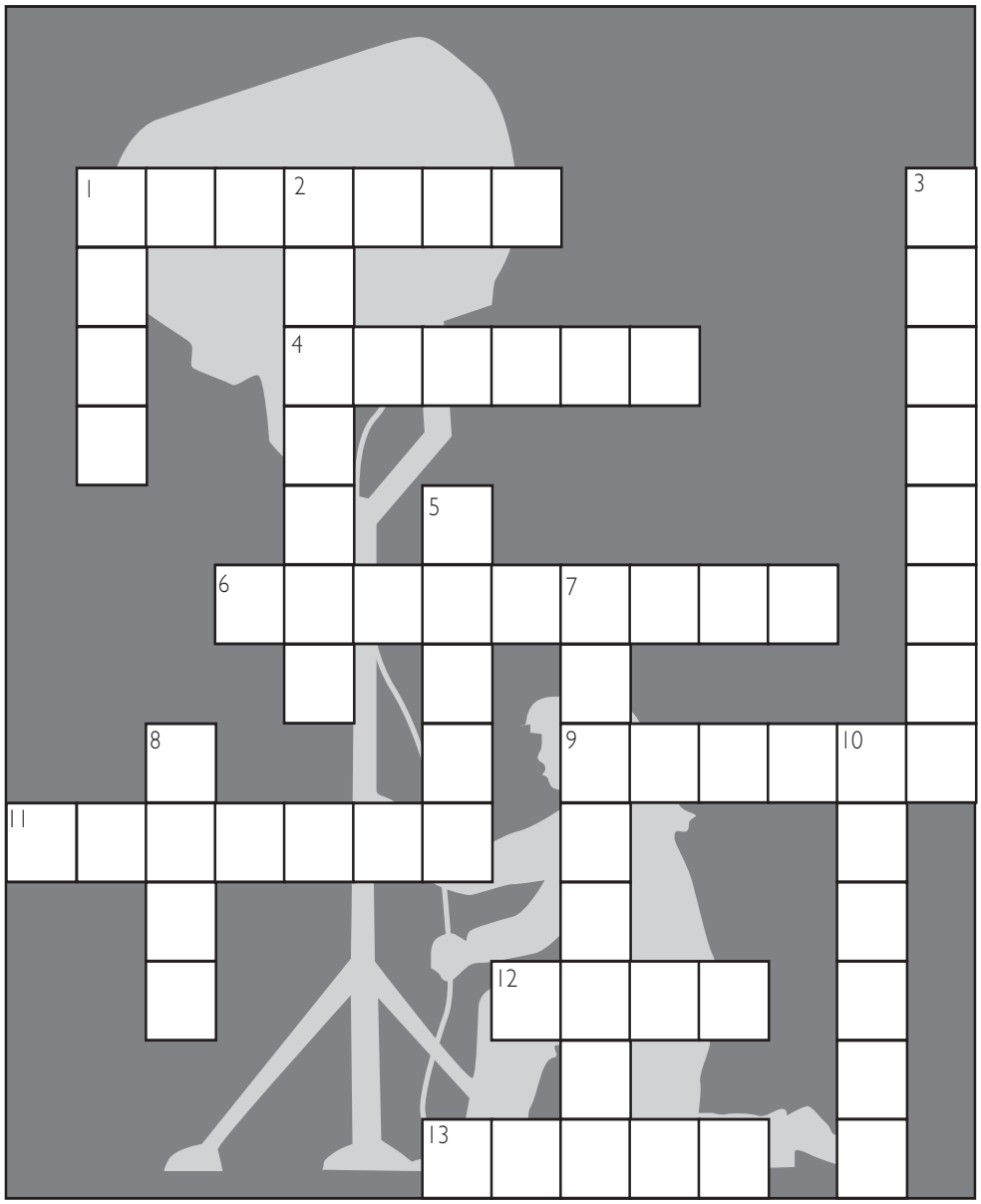
1. West Orange is in the _____ part of New Jersey.
2. The capital of New Jersey is _____.
3. New Jersey is bordered on the north and the northeast by the state of _____.
4. The _____ River forms the northeast boundary of New Jersey.
5. The _____ borders New Jersey on the east.
6. Two states border New Jersey to the west. They are _____ and _____.
7. _____ is New Jersey's largest city. It is followed in population by _____ and _____.
8. In area, New Jersey consists of _____ square miles.
9. _____ is the state university of New Jersey.
10. A turning point in the Revolutionary War took place in New Jersey in December, 1776, when George Washington defeated the Hessians at the Battle of _____.
11. In 1869, the now popular collegiate sport of _____ was first played at New Brunswick, New Jersey.

Name _____ *Date* _____

Solve a Movie Crossword

Across

1. Another name for a peep show
4. Penny _____
6. Projector invented by Thomas Armat
9. Price charged by nickelodeons
11. Needed to view a 3-D movie
12. *The* _____ *Singer*, the first sound movie
13. *The Great* _____ *Robbery*



Down

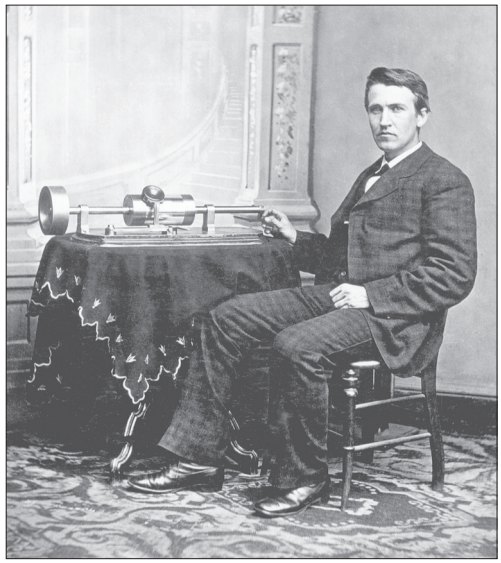
1. "_____ Ott's Sneeze"
2. Comedian Charlie _____
3. A short film about current events
5. He opened the first nickelodeon.
7. Projection method that used three cameras
8. "Ladies, Kindly Remove Your _____."
10. Inventor of the kinetoscope

CHAPTER 8

Recording Devices

In this age of compact discs, tape cassettes, and radios, it is difficult to imagine not being able to listen to music. A push of a button or a turn of a knob brings familiar tunes immediately to our ears. But until the late 1800s, people had to either make their own music or go to concerts. That was because there was no way to record sound for later use.

All this changed in 1877 when Thomas Edison invented the phonograph. Edison was a workaholic who often spent 20 hours a day in his laboratory in Menlo Park, New Jersey. He even kept a bed there so he could work uninterrupted. Both his wives (his first died after 13 years of marriage) complained that he ignored his family in favor of his work. Their complaints were not without foundation. One hour after his marriage to 16-year-old Mary Stilwell on Christmas Day, 1871, Edison was back at work in his lab!

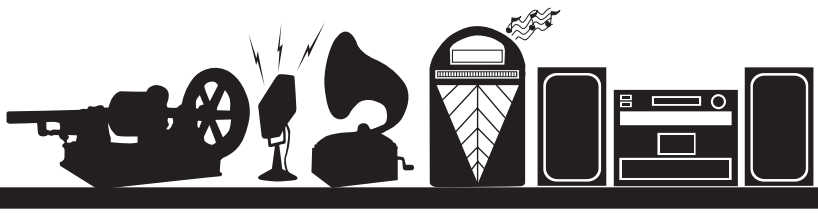


A youthful Thomas Edison poses with his phonograph. This photograph was taken in 1878 by famed Civil War photographer Matthew Brady.

Although he held almost 1,100 patents in the United States and even more in other countries, Edison considered the phonograph his favorite invention. No other inventor had ever tried to make such a device, and Edison was surprised that it worked the first time he tried it. Depending on which source one tends to believe, the first words he spoke into his new invention were either "Halloo, halloo" or "Mary Had a Little Lamb."

When Edison started work on the phonograph, he was actually trying to make a dictating machine. His device was simple enough. It used no record but consisted instead of a cylinder covered with tinfoil. Words spoken into a diaphragm moved a sharp stylus, or needle, that cut a pattern into the tinfoil as it rotated on the cylinder. The "recording" was heard by moving the needle to the beginning of the grooves and turning a crank to make the cylinder turn. As with early radios, the sound produced by Edison's first phonograph was so weak that earphones had to be used. Later, a listening horn made earphones unnecessary.

Edison manufactured several hundred phonographs, which were displayed around the country. Audiences paid admission to hear the machines play back recordings of popular songs. Then a strange thing happened. Edison lost



interest in his invention and turned to other matters in his laboratory. Thus the phonograph remained unchanged until 1885, when Chichester Bell and Charles S. Tainter came out with an improved model that substituted a wax cylinder for Edison's tinfoil-covered cylinder.

Recordings continued to be made on a cylinder until Emile Berliner developed the first phonograph record in 1895. Berliner's record was a flat, circular disc made of zinc and coated with wax. At first entertainers had to perform the same song over and over, because there was no way to make multiple records. Then, in 1901, Berliner invented a way to make duplicate records from one master disc. This made the phonograph popular with leading singers and orchestras of the day.

An orchestra makes a recording in this undated photograph. Notice the large recording horn, which was used until the electric microphone appeared in 1925.

Singers had no problem making a record because they could stand close to the recording horn. But with an orchestra it was a different story. It was impossible for all members of an orchestra to get close enough to the horn for their instrument to be heard properly. As a result, early recordings were characterized by poor and scratchy sound quality.

Another problem had to do with the length of a record. Early records turned at 78 revolutions per minute, which meant they could hold only about four minutes of music. Inasmuch as symphonies lasted much longer, recording companies had to record them on a number of individual records.

Some time passed before longer-playing records appeared, but the problem of poor sound quality was solved in 1925 when Joseph Maxfield at Bell Telephone Laboratories in New Jersey invented an electric microphone that took the place of the brass recording horn. The electric microphone made it possible for every instrument in an orchestra to be picked up and recorded. Overnight, the quality of sound was vastly improved.

High-quality recordings came just in time for the juke box, which was introduced in 1930. The juke box was a large cabinet that contained a phonograph with an automatic record changer. By inserting a coin and

pushing a button, a person could select a record from a large number of offerings. Juke boxes were made of translucent plastic and included such eye-catching features as chrome, mirrored glass, and fluorescent lights. Throughout the 1930s and beyond, juke boxes blared out popular tunes that kept music lovers swaying and dancing all across America. Also known as nickelodeons, these colorful music machines are still found today in antique stores, flea markets, and nostalgic restaurants.

While a buddy looks on, a soldier during World War II makes a selection on a juke box. The juke box had come on the scene about 10 years earlier.

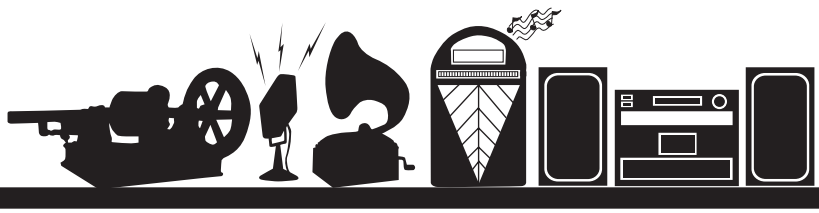
In 1947, the long-playing record was invented. The LP, as it came to be called, turned at only 33⅓ revolutions per minute. Since it revolved so slowly, it provided more than 20 minutes of entertainment on each side instead of the 4½ minutes of the 78 rpm it replaced. Inventor Peter Goldmark is given credit for making the 33⅓ rpm record album a reality.

Long-playing records became even better with the development of high fidelity. High-fidelity recording is a way of reproducing sound so that it is as much like the original as possible. To do so, it makes use of amplifiers, wide-range speakers, and sensitive needles. High fidelity itself was enhanced in 1957 with the introduction of stereophonic sound, which lends a three-dimensional effect to music.

The music industry received another boost in 1960 with the invention of the tape cassette. Because the transistor had been invented in 1948, tape recorders became less expensive and much smaller. (The invention of the first tape recorder in 1898 is discussed on page 60.) By 1980, tape recorders had been reduced so much in size as to make possible the "Walkman" portable stereo system. The Walkman enables people to listen to taped music while they are walking, jogging, or pursuing other activities.

A final development in recording occurred in 1982 with the appearance of the compact disc. The small compact disc has advantages over both records and tapes. Records can be scratched and tapes can tangle and break, but CDs do not wear out from use. This is because impressions on the discs are read by a light from a miniature laser. Even scratches on the surface of a disc do not affect its sound quality.

The phonograph and its successors are not the only recording devices that



Two teenagers sit among an assortment of long-playing records. The LP revolutionized the recording industry in the years following World War II.

have changed our lives. There are many others, but space limits the remaining coverage to only two: the tape recorder and the dictating machine.

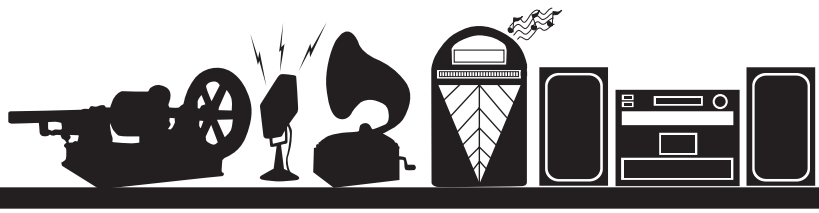
Valdemar Poulsen, a 20-year-old Danish inventor, made the first tape recorder in 1898. Recordings were made on steel piano wire rather than magnetic tape, which didn't come into use until later. Although Poulsen demonstrated his invention at the Paris Exposition of 1900, the tape recorder did not come into wide use until 1935. In that year, two German companies, Telefunken and I. G. Farben, came out with a plastic tape coated with magnetic iron oxide that replaced Poulsen's steel wire.

In a tape recorder, the magnetic tape travels from a feed reel to a take-up reel, all the time running over a recording head. The recording head carries impulses picked up by a microphone. These impulses record a pattern on the tape that remains until the tape is magnetically erased. Tape recorders vary in size from large types used in studios to portable models that accommodate cassettes. There are also video cassette recorders (VCRs) that are used to tape programs on television.

The dictating machine is similar in many ways to both the phonograph and the tape recorder. It is used to record messages that are later typed. Thomas Edison came out with the first dictating machine in 1878. It was called the Ediphone.

With the dictating machine, a person talks into a microphone that is connected to a recorder. The recorder makes a record similar to that for a phonograph. When the recorded message is ready to be typed, the typist puts the record into a transcribing machine. He or she then listens to what has been dictated and types the message on paper. In time, tapes and discs replaced records in dictating machines.

From Thomas Edison's first crude phonograph to today's advanced VCRs, CDs, and DVDs, humankind has reaped the benefits of more than 100 years of progress in the recording industry. What will come about in the next 100 years is undoubtedly limited only by our imaginations.



Name _____ *Date* _____

Arrange Events in Chronological Order

Using the numbers 1 through 15, place the recording devices and inventions listed in the order in which they appeared.

____ Ediphone

____ Walkman

____ Duplication of records from one master disc

____ Tape recorder

____ Transistor

____ First phonograph record

____ Wax cylinder, replaces Edison's tinfoil cylinder on early phonographs

____ Compact disc

____ Edison's phonograph

____ Magnetic plastic tape

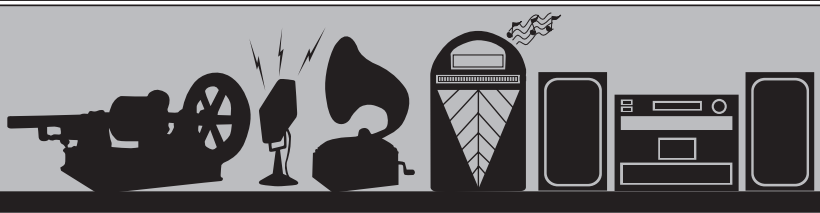
____ Tape cassette

____ Electric microphone

____ Juke box

____ Stereophonic sound

____ Long-playing record



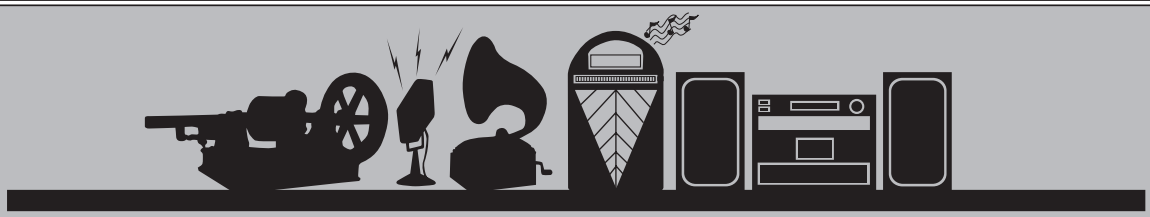
Name _____ *Date* _____

Complete a Word Search

Here are 30 words from Chapter 8. Find and circle each in the word search. The words run horizontally, vertically, and diagonally. None are upside-down or backward.

AMPLIFIER	CASSETTE	COMPACT DISC	CONCERT
CYLINDER	DIAPHRAGM	EARPHONES	EDIPHONE
HORN	JUKE BOX	LABORATORY	LASER
MACHINE	MAGNETIC	MICROPHONE	MUSIC
NEEDLE	ORCHESTRA	PHONOGRAPH	PATENT
PORTABLE	RECORD	TRANSISTOR	SOUND
SPEAKER	TAPE	STEREOPHONIC	REEL
	VIDEO	WALKMAN	

P I R H A X L A B O R A T O R Y T R K
T H C R O C D A F G H P J K L M N O E
P Q O R T R A N S I S T O R S T J U A
V W M N X Y N R T E Z C D R G F U M R
H J P L O K M N E P R S T T T R K R P
C C A A D G D O R C H E S T R A E X H
Z K C Z T L R G E E O G H J M N B L O
B B T C C E D A O D E R T W K K O L N
F C D X Z P N R P S P L D A A H X H E
A E I O N B B T H H C H J L P K L N S
C A S S E T T E O B D X Z K S E C D M
O M C X E B D C N Z S D K M R N P S A
N P P Y D C F D I A P H R A G M H J A
C L N X L Z B D C X V Z K N F A A S G
E I D R E I S T M U S I C B D C T S N
R F B C R I N S T R I E D I P H O N E
T I K S O U N D C D E F G E H I K L T
M E N P Q R S P E A K E R V O N W X I
Y R Z V A I M I C R O P H O N E U V C



Name _____ *Date* _____

Recall Important Facts

The ability to recall information from something you have read is an important learning skill. See how well you can answer the questions without referring back to the narrative.

1. Explain the basic principles of Edison's first phonograph.

_____

_____

2. Why could a 33 $^{1}/_{3}$-rpm record accommodate five times as much music or sound as a 78 rpm?

_____

_____

3. How did the electric microphone improve the sound quality of records?

_____

_____

4. In what ways are tape recorders and dictating machines communication devices?

_____

_____

5. How does a CD work. What advantages does it have over a record?

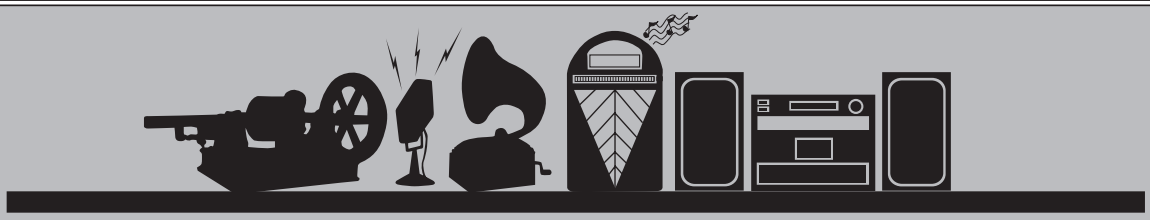
_____

_____

6. What is high fidelity?

_____

_____



Name _____ *Date* _____

Draw a Picture

In an encyclopedia or a book dealing with inventions, find pictures illustrating some of the early recording devices discussed in this chapter. Then, in the space provided, draw and color a picture of one of these. You could draw an early phonograph, a tape recorder, a juke box, or any other device.

On the lines at the bottom, write an interesting fact about the recording device you have drawn.

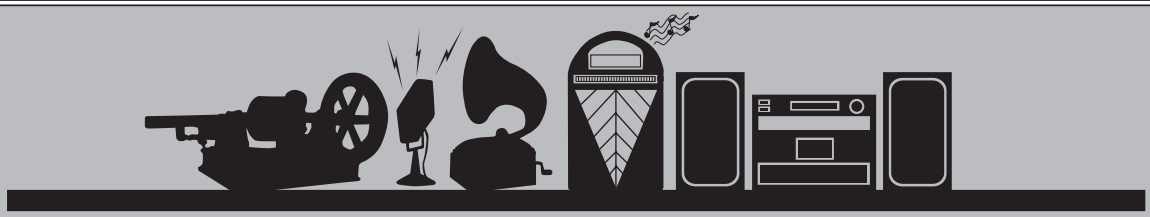
_____

_____

_____

_____

_____



CHAPTER 9

Television

The year is 1951. The place is a sidewalk outside an appliance store in Anytown, U.S.A. It is raining, but the drenched crowd with faces pressed against the plate-glass window of the store doesn't seem to mind. These fascinated spectators are watching the first coast-to-coast telecast of a major league baseball game, and no amount of rain is going to keep them from it.

A crowd watches television through the window of a department store. Such sights were common in the early 1950s.

Why, you might ask, don't these diehard fans go home and watch the game in the comfort of their living rooms or dens? The answer is simple: in 1951 very few Americans owned television sets. Television was a new means of entertainment that was just beginning to take hold in the early 1950s. Therefore, the sight of curious onlookers gawking through a store window at a televised program was not unusual in those years. Many Americans, the author included, could admit to spending at least part of their childhood engaged in such pursuits.

Although television did not become popular until after World War II, it had been around since the 1920s. Vladimir Zworykin, a Russian-born American physicist, is sometimes referred to as the "father of television." In 1923, he received a patent for the first television camera, which he called the iconoscope. The following year, he was granted another patent for the kinescope, the first television picture tube. With these two inventions, he was able to show that it was possible to send pictures through the air.

One of the first images transmitted by television was a picture of the cartoon character Felix the Cat. It was sent from New York City to Kansas in 1928 as part of an experiment. Two years later, the National Broadcasting Company (NBC) started an experimental station in New York City. Then on July 21, 1931, the Columbia Broadcasting System (CBS) began transmitting regular television broadcasts from the same location. Television broadcasts were limited to the New York area until the late 1930s.

Millions of Americans saw television for the first time at the 1939 World's Fair in New York. Fair-goers watched breathlessly as President Franklin Delano Roosevelt's official opening of the fair on April 30 was televised. But, amazed

as they were, people did not immediately rush out and buy television sets. RCA, for example, sold only 400 sets in the first five months following the World's Fair. Not only were television sets expensive, but television itself was viewed more as a novelty than as a form of entertainment to be taken seriously.

Even for those Americans who showed interest, early television left much to be desired. The first sets sold commercially were console models (sets encased in a wood cabinet that stood on the floor). These early models had such small picture tubes that viewers had to sit close to a set to see clearly what was showing on the five-inch screen. In addition, picture quality was poor, there was a limited number of programs, and all programs were in black and white. Color television did not appear until 1954, and it was some time after that before color sets became fixtures in American homes.

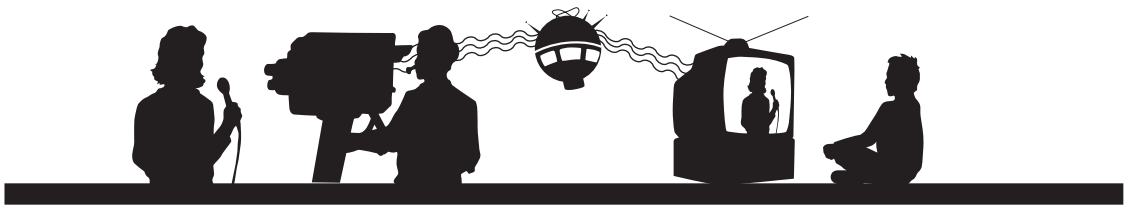
Television was put on hold during World War II. All production stopped as America's resources were directed toward the war effort. When the war ended in 1945, production began again, and gradually the new entertainment medium caught on. Americans stopped watching television through store windows and starting buying sets for themselves. By 1960, they had purchased more than 75 million sets.

A family watches television on an early set. Judging from the size of the screen, this picture was probably made in the mid-1950s.

As it does today, in the early days television had both supporters and critics. Supporters at first thought that television would serve to bring families closer together. They were dismayed when results showed that parents and children watched the screen for hours and never exchanged a word.

Critics were concerned with what they considered poor programming. They wondered how an array of what they called "high-handed comedies" and "showy quiz shows" would affect Americans. Their concern over quiz shows was borne out somewhat when at least one, NBC's *Twenty-One*, proved to be rigged. A Columbia University instructor who made a long run on the show had actually been given all the answers in advance.

Television's critics also maintained that producers had sold out to advertisers. As is true today, every program was frequently interrupted by

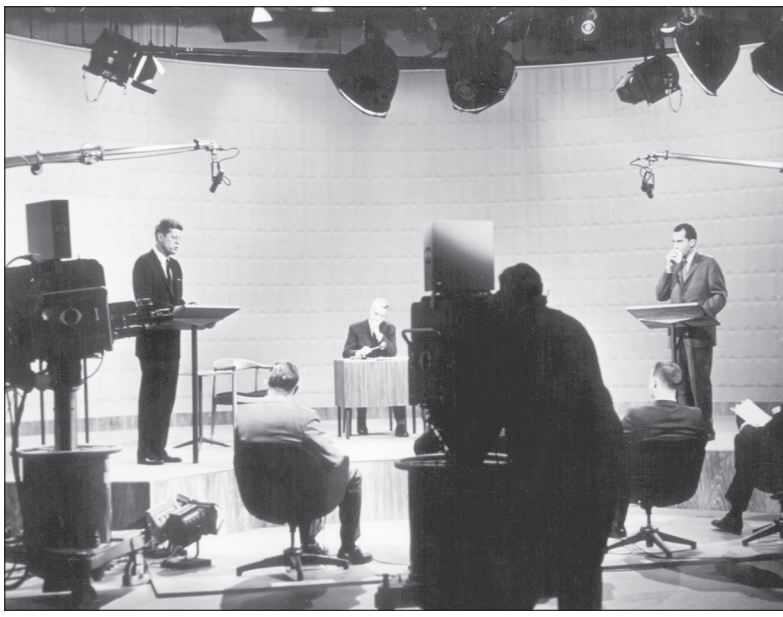


commercials. Flying beer bottles, zooming candy bars, and singing cough drops virtually jumped off the screen at viewers. In another criticism that also has a familiar ring, many people felt that television depicted crime and violence too realistically. They worried that children might be negatively influenced by watching such programs.

In spite of its critics, television soon replaced radio as the preferred means of home entertainment. Sets came down in price, and by the 1960s, 90 percent of American homes had at least one set. The quality of programs also improved. Networks and local stations broadened their coverage by adding documentaries, prime-time movies, and political and sporting events.

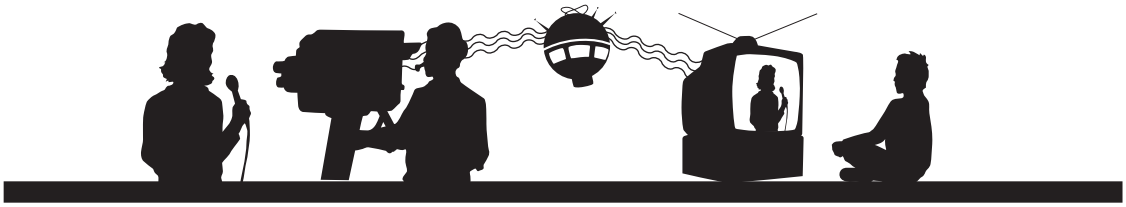
Commentator Edward R. Murrow's *See It Now* and *Person to Person* were two of the first documentaries to enjoy success on national television. Documentaries are programs that focus on public issues, real-life situations, or historical events. Two early World War II documentaries, *Victory at Sea* and *Winston Churchill: The Valiant Years,* were also well-received by viewers. They were still being shown on both commercial and public television stations many years after they were produced.

Few political events have had more impact on television than the 1960 Presidential debates between Richard M. Nixon and John F. Kennedy. An estimated 65 million people, out of a total population of 179 million, watched the four debates—the first ever between presidential candidates on national television. The power of television to influence voters was apparent from the start. Viewers were impressed with Kennedy's calmness and relaxed manner, while Nixon appeared perspiring and unsure of himself. He even looked unshaven to the millions who watched. How many votes Nixon lost because of the debates could not, of course, be determined.



John F. Kennedy and Richard M. Nixon "square off" in one of four debates in which they participated in the 1960 Presidential campaign.

Sporting events began to attract large audiences in the 1950s and 1960s. Television, in fact, made professional football the most popular sport in America. And professional basketball, which had experienced financial



difficulties for years, rebounded when it secured a lucrative television contract. Even the World Series felt the influence of television. Before television came on the scene, all World Series games were played during daylight hours. Today, most games of the World Series, as well as those of the league playoffs, are played at night, when television audiences are the largest.

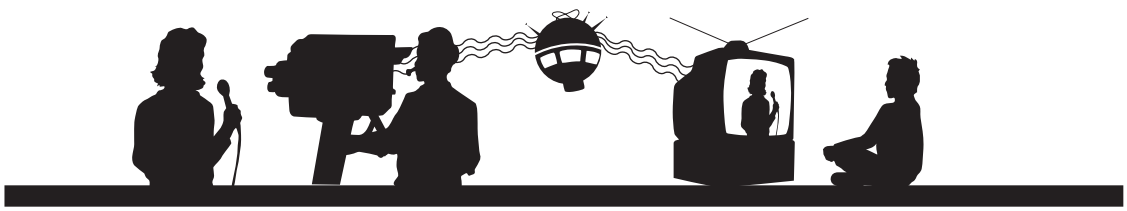
New developments in the 1950s and 1960s made television even more appealing. Color was added in 1953, and station WNBQ of Chicago became the first all-color station in the United States in 1956. On July 10, 1962, NASA launched *Telestar I*, the world's first television communications satellite. It transmitted the first international telecast across the Atlantic on July 23. Three years later, *Early Bird* became the first privately owned communications satellite to be put into orbit. From 1965 onward, overseas telecasts became increasingly commonplace.

Watching television during its early years. How does the set the boy is sitting in front of compare with televisions today?

There is no questioning the impact of television as a powerful communicator. Whether we realize it or not, our beliefs and values may be strongly influenced by what we see on television. The way we view politics and social issues are determined in part by the programs and commercials we watch, as are our opinions of events taking place around the world. We are especially susceptible to the television commercial. Many of the purchases we make result from our being persuaded by television advertising.

The influence of television, however, goes far beyond the commercial realm. In addition to keeping people informed about national and world events, it has proven to be an excellent teaching tool. Educational channels and public television stations offer worthwhile programs to children and adults alike. Even commercial stations air documentaries and panel shows that are both educational and informational in scope.

Television serves still other purposes. In the business world, people in various cities can "meet" via television, saving time, money, and travel. Space probes send back televised pictures of distant planets, and astronauts communicate with Earth by means of television. Television assists doctors in the operating room and enables technicians to work with dangerous materials at a safe distance. Finally, television cameras make possible surveillance in banks, stores, schools, prisons, and asylums. As a means of communication, television provides great value.



Name _____ *Date* _____

Conduct a Survey About Television

Interview three classmates as to their television viewing. Ask them these four questions, and record your findings.

1. How many hours of television do you watch each week?

   Classmate 1 _____ Classmate 2 _____ Classmate 3 _____

2. What kinds of programs do you enjoy most?

   Classmate 1 _____

   _____

   Classmate 2 _____

   _____

   Classmate 3 _____

   _____

3. What kinds of programs do you seldom watch? Why?

   Classmate 1 _____

   _____

   Classmate 2 _____

   _____

   Classmate 3 _____

   _____

4. Do your parents limit or monitor the programs you watch? If so, in what ways?

   Classmate 1 _____

   _____

   Classmate 2 _____

   _____

   Classmate 3 _____

   _____

Name _____ *Date* _____

Solve Some Television-Related Math

The survey you did on the previous page involved real people and their television habits. The seven students listed in the chart are imaginary, but the number of hours they spend each week watching television might be similar to those of you and your friends.

Look back through your math book and review mean, mode, median, and range. You will need this information to solve the problems related to the chart.

Hours of Television Watched Weekly

Emily	18
Megan	22
Kiyoshi	18
Shondra	21
Aaron	25
Jose	16
Lupe	20

1. Using the chart above, what number represents the mode? _____ the median? _____
2. What is the range? _____ the mean? _____
3. Using the statistics from the chart, create two word problems in the space below. Ask a classmate to solve them.

Name _____ *Date* _____

Complete Statements Started for You

At right are four statements concerning television that have been started for you. Finish each on the lines provided.

1. Last night, the only television we have in the house went out. For a moment, we panicked. What would we do? Finally we . . .

_____

_____

_____

_____

2. If I were in a position to change television today, I would . . .

_____

_____

_____

_____

3. My neighbors next door are an elderly couple who grew up in the days when radio was America's favorite form of entertainment. To their good-natured challenge that I name three advantages that modern television has over radio, I replied . . .

_____

_____

_____

_____

4. To the statement, "Violence on television has led to an increase in violence in real life," I would reply . . .

_____

_____

_____

_____

Name _____ *Date* _____

Fill That Cornerstone

Imagine that you have been asked to help select items to place in the cornerstone of a new building. Your assignment is to determine five television programs that best describe life in America today. Tapes of these programs will be added to the cornerstone for the benefit of future generations.

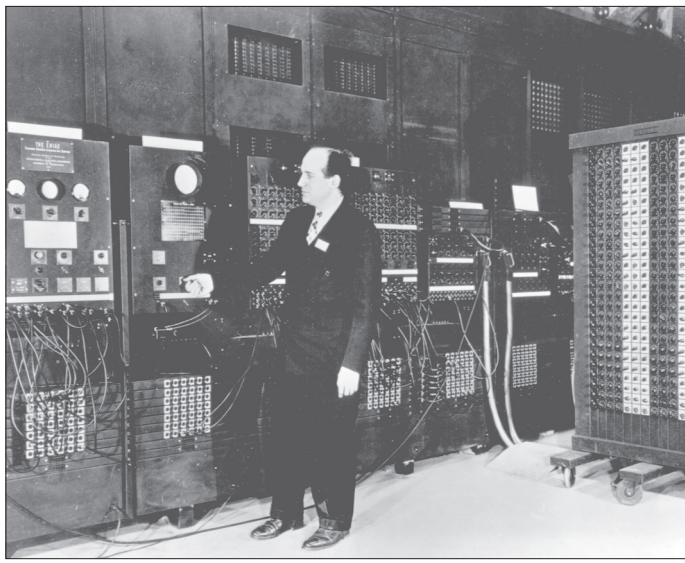
On the lines provided, list the five programs you would select, and explain why you would choose them.

CHAPTER 10

Computers

Can you imagine a computer containing 18,000 vacuum tubes? Or one that occupies 1,500 square feet of floor space? Or one that uses 150 kilowatts of electric power while running? Would a computer of such dimensions and energy consumption be practical?

Not today. But, in 1946, that was the best the world of technology could offer. The above paragraph describes ENIAC, the first all-electronic digital computer. ENIAC stands for "Electronic Numerical Integrator and Computer." To appreciate its colossal size, a closer look at the above figures is worthwhile. Eighteen-thousand vacuum tubes would be similar to a machine containing 18,000 light bulbs! Fifteen-hundred square feet of floor space is equivalent to that of a small house. And 150 kilowatts of electricity being consumed while the machine was in operation? This means that ENIAC used about as much energy in 30 minutes as some households used in a day.



ENIAC, the world's first all-electronic digital computer. ENIAC weighed 30 tons and took up as much space as a small house.

Howard Aiken, a Harvard University professor, is given credit for inventing the computer in 1944. His Mark I machine weighed five tons and consisted of 760,000 separate pieces controlled by prepunched paper tape. Using thousands of relays, or switches, instead of vacuum tubes, it was used primarily by the U.S. military for mathematical computations to aid in aiming various types of artillery. By today's computer standards, Aiken's machine was slow. It required 3–5 seconds to complete a multiplication operation.

Neither Mark I or ENIAC, however, were like present-day computers, because they could not store information or instructions. They could perform only one application at a time without being manually rewired. The first computer with memory was the BINAC, the Binary Automatic Computer. It was designed by J. Presper Eckert and John W. Mauchly at the Moore School of Engineering of the University of Pennsylvania in 1947. The BINAC was considerably smaller than ENIAC, containing only 1,400 vacuum tubes instead of 18,000. Its ability to store programs resulted in the evolution of the computer into the machine it has become today.

What really revolutionized computers, however, was the invention of the transistor in 1948. The transistor was developed by three American scientists: John Bardeen, Walter H. Brattain, and William Shockley. Transistors are only a fraction of the size of vacuum tubes and last much longer. In addition, they do not have to warm up before functioning. When computer designers switched to transistors, computers became smaller and more reliable. They also could be sold at a lower price.

The age of personal computers began in 1959 with the appearance of the IBM Model 1401. It was the first computer sold in large numbers. Still extremely large in size, the IBM Model 1401 cost about $10 million. A few years later, IBM and other companies started turning out even more compact models. Their goal was to produce a computer that could be sold to small businesses and to individuals.

Compare the size of the monitor of this early personal computer with those of computers today. In this age of laptops, it is hard to imagine that computers were once so large.

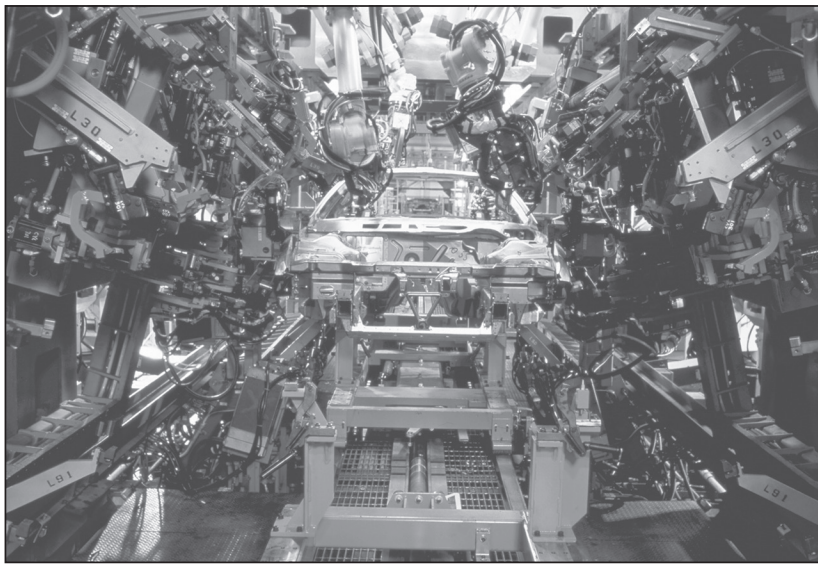
Two developments led to personal computers as we know them today. The first was the invention of the integrated circuit. Developed by Jack S. Kilby of Texas Instruments in 1960, the integrated circuit was a way of grouping large numbers of transistors in a tiny space. Thousands of transistors could be arranged on a chip of silicon a fraction of a millimeter thick. Some silicon chips, in fact, are so small that they can easily fit through the eye of a needle. The use of silicon chips brought down the price of computers considerably by the mid-1960s.

Computers decreased more in size when computer chips, specifically the microprocessor, appeared in the 1970s. Such chips, instead of being designed to handle one specific function, had circuits that could do the work of all the different parts of a computer. As computers became smaller and less expensive, small businesses, schools, and individuals began to use them to keep records, teach information, and fulfill a multitude of services. Some microcomputers are so small that they are used in cameras, sewing machines, electronic games, and many other consumer products.

Everywhere we go we see computers at work. Did you realize that your telephone operates because of a large computer? When you call someone, the computer finds the number you dialed. And what about the checkout counter at the supermarket or the ATM machine at the bank or the mall? Computers

are at work there, too, adding up the cost of your groceries or giving you the amount of money you requested.

Computers are important in still more places. They are used by the weather service to predict forecasts and to track the paths of tropical storms and hurricanes. They are used by air traffic controllers to guide airplanes in and out of airports. They are used by doctors and nurses in hospitals and by firefighters at fire stations. Even police cars are equipped with computers.



Auto assembly plants are one of many places where computers are put to use. Here, computer-operated robots assemble an automobile.

Industry has found numerous uses for computers. Computer-operated robots build cars in factories and handle radioactive materials in laboratories. Many oil refineries and electrical generating stations are run by computers, as are looms in textile factories. The space industry relies heavily on computers. In addition to launching satellites and shuttles, computers operate simulators that prepare astronauts for the conditions they will have to deal with in space. Few aspects of industry have gone untouched by computers.

At home, people use computers to write letters, keep records, do schoolwork, or perform countless other tasks. If their computers are equipped with a modem, they can do things that were only dreamed of a short time ago.

A modem is a device that communicates with other computers over telephone lines. For a monthly fee paid to a provider, computer owners can use their modems as often as they like. They can send messages (called electronic mail, or e-mail) to friends and associates and receive replies back in a matter of minutes—all accomplished without postage or a walk to the mail box.

Electronic mail, as well as other services, is made possible by the Internet, the worldwide network linking millions of computers. The Internet is a relatively recent medium, having been preceded in 1969 by ARPANET. ARPANET stands for Advanced Research Project Agency Network, and it was commissioned by the U.S. Department of Defense to do research into networking. It remained in service until 1989, linking a small number of

computers. In comparison, its successor, the Internet, has the capacity to link billions of computers worldwide. (The Worldwide Web, an application of the Internet, came into service in 1992.)

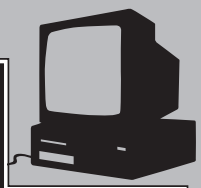
The Internet has opened up new worlds in the field of communication. Computer owners with a modem can use their web browser to obtain information on any subject of interest. A few clicks of the mouse brings them pictures and data on everything from ants to atomic bombs or transports them to the country or continent of their choice. Further, "chat rooms" enable users to communicate back and forth, almost as quickly as in spoken conversation, with people from all over the world. Students can also use chat rooms to discuss topics with students in classrooms in other areas. It is even possible to ask questions of contemporary authors and receive answers back through the medium of the chat room.

A woman using an ATM machine, another service made possible by computers. ATM machines allow people to deposit or withdraw money from their accounts at their convenience.

What does the future hold for computers? One development that will most likely become a reality is the computerized home. Experimental houses in which almost everything is controlled by a computer have already been built. In your house of the future, a computer might open the doors of the house and turn the lights off and on. In addition, sensors following your every move might turn off lights when you leave a particular room. The computer might keep heating and air-conditioning units at a preferred temperature and also automatically open and close windows. There probably is not a single function connected with a house that a computer could not be programmed to do.

How would you enter your computerized home? A simple key would be old-fashioned and not in keeping with the age. To enter, you might punch your identification code into a keyboard near the door. The computer might also be programmed to let in certain people at the exclusion of others. It could even record voice messages from visitors.

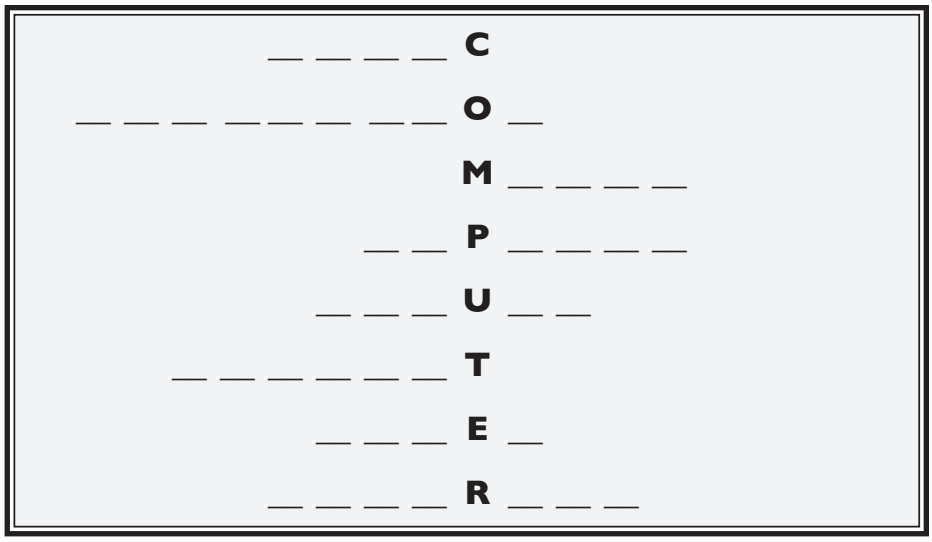
In summary, computers have given a whole new meaning to the word *communication* and point to the tremendous strides humankind has made since the days of Indian smoke signals.



Name _____ *Date* _____

Solve a Computer Puzzle

Complete the sentences at the bottom of the page to fill in the missing letters of the computer puzzle.



1. _____ was the first all-electronic digital computer.
2. The invention of the _____ led to the displacement of vacuum tubes in computers.
3. With a _____, a computer user can send a message over the telephone line.
4. _____ was a network established in 1969 by the Defense Department.
5. The ENIAC computer contained 18,000 _____ tubes.
6. Jack S. Kilby of Texas Instruments invented the integrated _____ in 1960.
7. Howard _____ of Harvard University is credited with inventing the computer in 1944.
8. The _____ is the worldwide network that connects millions of computer users.

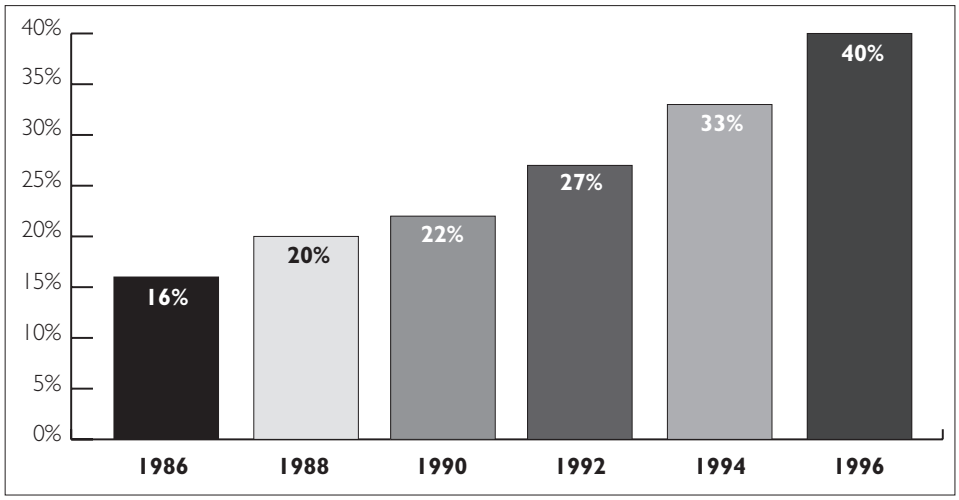
Name _____ Date _____

Interpret a Bar Graph

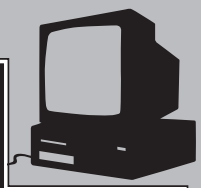
As was pointed out in Chapter 10, very few homes had computers at first. Early computers were so large and expensive that there was no way to adapt them to home use. The advent of the transistor and the integrated circuit brought the size and cost of computers within the range of the average consumer. Since that time, the number of homeowners with computers has increased steadily.

Here is a graph that shows the number of American homes with computers during the 10-year period from 1986 to 1996. Use the information from the graph to answer the questions.

Percentage of Households with Computers



1. During which two-year period was there the greatest increase in the number of households with computers?
   _____
2. Which two-year period showed the least increase?
   _____
3. According to U.S. Census Bureau statistics, there were approximately 92 million households in the United States in 1990. In round figures, how many of these households had computers? _____
4. If the number of American households had increased to 97 million in 1994, how many owned computers? _____
5. Over the span of which years did the percentage of households with computers double? _____



Name _____ *Date* _____

Use Your Critical Thinking Skills

As time passes, computers increasingly impact our lives. One would be hard-pressed to find a business, school, or office that does not rely on computers to keep records and to perform a large number of other functions. Computers are everywhere, and their presence becomes greater every day.

But do computers pose a threat to jobs and to the way we have always done things? Some people think so; others do not. With this thought in mind, use your ability to think critically and respond to the questions.

1. In which industries have computers had the greatest impact? What does the future hold for workers who may have been displaced by computers?

_____

_____

_____

_____

_____

2. There are those who believe that computers will someday replace teachers in the classroom. Do you agree or disagree with this concern? Why or why not?_____

_____

_____

_____

_____

_____

3. What other uses do you think will be found for computers in the future? How will such developments affect our daily lives?

_____

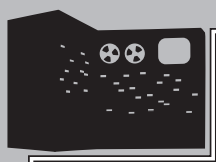
_____

_____

_____

_____

_____



Name _____ *Date* _____

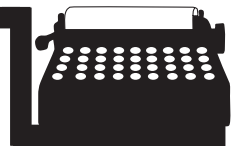
Write a Time-Travel Story

Imagine that through a time machine you are whisked back to the year 1850. You land somewhere on the Plains in the presence of an Indian sending a message by smoke signals. You smile and shake your head as you compare his primitive means of communication with your new computer at home.

You decide to tell your newly found Native American friend all about present-day technology. He is naturally curious and asks you many questions. For the sake of convenience, assume that he speaks English.

On the lines, create a dialogue that might have taken place as you explained the wonders of modern communication. Continue on a separate sheet of paper, if necessary.

CHAPTER 11

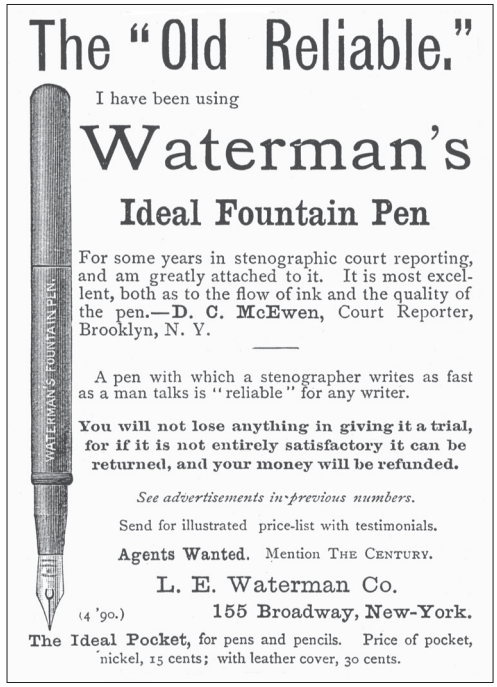


Other Methods

The telegraph. The telephone. Motion pictures. Radio and television. The computer. All wonderful inventions that have changed the lives of people everywhere.

But there are other devices in the long history of communication that are also worthy of attention. Inasmuch as none of these fit comfortably into any of the first 10 chapters of the book, they are lumped together in this final chapter, entitled "Other Methods."

One such device is the fountain pen. Yes, the simple fountain pen is considered to be an important development in communication. Did you ever try to write with the quill of a feather or with a steel-nib (point) pen? It can be a slow and sometimes messy process as you continuously dip your implement in and out of an ink bottle. Yet, people wrote with quills for centuries, and little improvement was gained when they switched to steel-nib pens at the beginning of the 1800s.



An 1890 advertisement for Lewis Waterman's fountain pen. Inventors had been trying to make such an implement since the 1600s.

In 1880, an American named Lewis Waterman made penmanship easier when he came out with the first fountain pen. The stem of Waterman's pen contained ink that was inserted with an eyedropper. A slit in the nib of the pen allowed ink to flow onto the paper. Later, self-filling pens were introduced; with these, the stem was filled by dipping the nib into ink and then raising and lowering a lever located on the shaft. Still later, ink cartridges that fit into the stem came into use, making the fountain pen an even more practical tool.

Eight years after Waterman introduced the fountain pen, another American named John J. Loud invented the ballpoint pen. The ballpoint pen contained a rolling ball that picked up ink from an ink cartridge and transformed it onto paper. Although convenient, Loud's pen was not well-received by a public in love with the fountain pen. It was not until 1938 that George and Ladislao Biro of Hungary patented the first ballpoint pen that became a commercial success.

Another important development in communication was the typewriter. The typewriter evolved from centuries of attempts by inventors to turn out a machine that could type letters on paper. Were you aware that Queen Anne of

England issued a royal patent to one Henry Mill in 1714 for such a device? Although evidence of the patent exists, no drawing or model of Mill's machine has ever been found.

The first typing machine in the United States was patented by William Austin Burt in 1829. Burt was a surveyor who lived in a log cabin in the backwoods of Michigan. Because he was also a territorial legislator with many letters to write, he was determined to make a typing machine that would speed up his correspondence.

The typewriter designed by Sholes, Glidden, and Soulé in 1867. It was first manufactured by E. Remington and Sons in 1873.

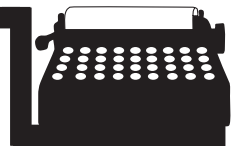
Burt borrowed some metal type from an editor friend and set to work. He arranged the type in a semicircle within a wooden box. To operate his machine, which he called the Typographer, he inked the letters with a pad and turned an arm to press each letter onto paper. The Typographer printed neatly and clearly, but since each individual letter had to be rotated into the desired position for printing, it was too slow to be practical. Writing by hand was still a faster way to get words on paper.

The first typewriter to be sold commercially was put on the market by E. Remington and Sons, a company that also manufactured guns and sewing machines. It was developed in 1867 by Christopher Latham Sholes and his two assistants, Carlos Glidden and Samuel Soulé. Sholes received a patent for the machine in 1868, and it went into production in 1873.

Sholes's machine looked more like a sewing machine than a typewriter. It even had a treadle, or foot pedal, to move the carriage. Yet, it was a big advancement over the primitive device patented by Burt almost a half-century earlier. Each metal letter, number, or mark did not have to be rotated into position as with Burt's Typographer; instead, it was controlled by its own key. Each key had an arm that lifted it to strike a ribbon soaked with ink. This printed the image on a piece of paper that was inserted between the ribbon and a rubber cylinder called a platen.

Early typewriters did not have a shift key. Capital letters and lower-case letters were on separate type bars. As time passed, both letters were put on one key, and the typist pressed down on the shift key to type a capital letter. Other features that were later added included a margin release, backspace lever, and a bell that warned the typist when the end of a line was near.

The first typewriters were large and cumbersome. In time, however, they came down in size to the point that the Corona Company introduced a



portable manual version in 1912. Electric typewriters appeared in the 1920s, and the first portable electric typewriter was marketed in 1957. Today, typewriters are little used, as computers have taken their place in offices and homes everywhere.

Although typewriters certainly speeded up communication, they were slow by modern standards. Making duplicate copies of any correspondence required that a person type the same information over and over again. The introduction of carbon paper helped some, but carbon copies of documents were often smeared and unclear.

The mimeograph machine and duplicating machine made it easier to make multiple copies. The first mimeograph machine came out in 1884. It had an ink-filled drum onto which a waxed-paper stencil containing typed, written, or drawn impressions was fastened. Copies were made by turning a crank on the side of the machine.

The duplicating machine appeared in 1929. The typist or writer used a carbon-coated sheet called a master sheet. After typing or writing on the sheet, the user clamped it in the machine and turned a crank to press paper against the moistened, sensitized master. Both mimeograph machines and duplicating machines were standard fixtures in schools and offices until recent times. Today, as you are no doubt aware, they have largely been replaced by copy machines.

Although the first commercial copier was not introduced until 1959, the copy machine itself had been invented 21 years earlier. On October 22, 1938, an inventor named Chester F. Carlson produced the world's first Xerox copy. (It should be pointed out that the term *Xerox* is derived from the Xerox Corporation, which grew out of Carlson's work. The process of making copies of written, printed, or pictorial materials is called xerography.)

Chester Carlson, photographed about 1940 with the first model of his Xerox copier. As you can see, it was quite different from today's copy machines.

Chester Carlson was a law student who worked in a New York City law firm's patent department. His experiments in xerography sprang from his desire to find a way to make copies of documents related to patents. Much of his early work was carried out in the kitchen of his apartment and in a room behind a beauty parlor on Long Island. The first copy he produced of anything was the inscription "10-22-38 Astoria," which represented the date and the place of his breakthrough.

A number of years passed before the process of xerography was perfected. In simple terms, xerography is an inkless process

that depends on static electricity rather than pressure to duplicate printed material. Paper is placed on a metal plate sprayed with electrons and powdered with a colored resin. Heat from an infrared light melts the resins in the powder, transferring the image to the paper.

One of the most advanced forms of communication to date is the facsimile machine, commonly called the fax. The facsimile machine has made it possible to transmit written or printed images by radio, telephone, or computer.

The facsimile machine works by converting images into electric signals. These signals go out through telephone lines to a receiving fax machine, which converts them back to the original image. The receiving machine then prints out a copy of whatever has been transmitted. Fax machines can be used with personal computers if the computer has a circuit board called a fax board.

The first fax machines transmitted via radio waves instead of telephone lines. Beginning in the 1930s, news services started providing newspapers with pictures for publication, all sent by radio waves. These early fax machines were cumbersome and sometimes difficult to use, and it was not until the 1970s that more practical machines came on the market.

The facsimile machine has revolutionized modern communication. Information can be sent and obtained in a matter of minutes instead of days. Letters, pictures, documents, and reports can be transmitted over thousands of miles almost instantly.

Today, many people who have computers and modems also have facsimile machines. A computer user with all of these devices can send or receive faxes at home. A faxed image that is received from another machine can either be displayed on a monitor or duplicated on a printer.

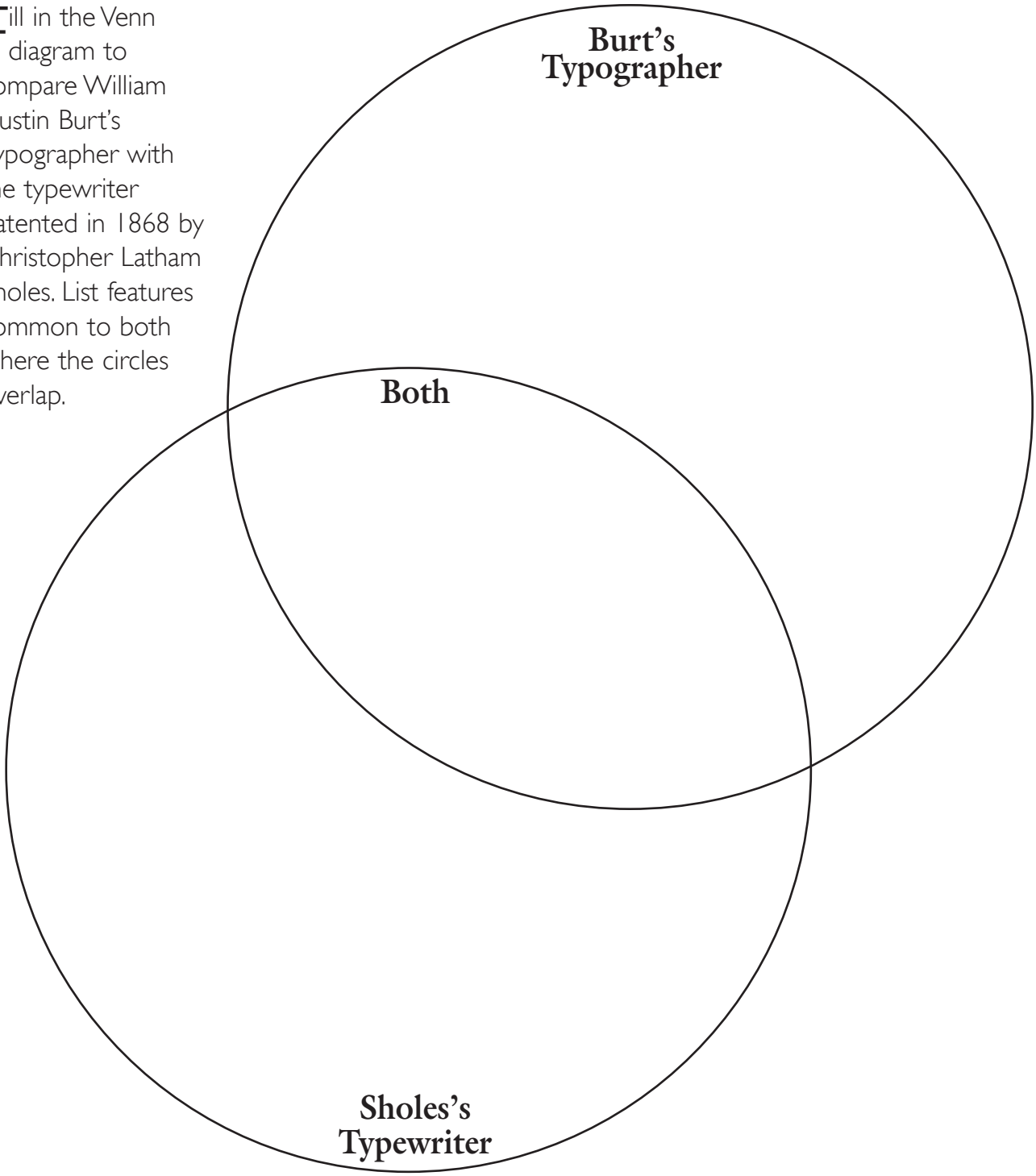
There are many other communication methods, of course, but these could not be included because of space limitations.

What does the future hold for communication? Developments in the next century could very easily make our methods of today seem primitive in comparison. There are even dreamers who think that someday it will be possible, through "transporters" such as those seen in science-fiction films and series, to beam people to another planet. What do you think?

Name _____ *Date* _____

Fill In a Venn Diagram

Fill in the Venn diagram to compare William Austin Burt's Typographer with the typewriter patented in 1868 by Christopher Latham Sholes. List features common to both where the circles overlap.



Name _____ *Date* _____

Solve Some Word Problems

Here are three word problems related to the communication devices covered in Chapter 11. Solve each, and write the correct answer on the line provided.

1. John bought a plain-paper ink-jet fax machine with a retail price of $595. If he received a 15% discount for paying cash, how much did he pay—before tax—for the machine?
   $_____

2. The J. D. Bronson Company purchased three color copiers at a cost of $689.99 each. What was the total price of the copiers after a sales tax of 6% was added?
   $_____

3. Shannon's mother averaged 70 words per minute typing on a manual typewriter. When she switched to an electric model, however, her rate increased to 91 words per minute. What percent increase occurred when she changed to the electric model?
   _____%

Name _____ *Date* _____

Rank Communication Devices

In this book you have read about achievements in communication from earliest times to the present. You traveled with humankind as it progressed from the most primitive means of communication to the advanced technology of today.

Many developments were covered: newspapers, the telegraph, the telephone, radio, television, and computers, to name a few. In a "Which came first: the chicken or the egg?" type of question, how would you rank communication devices in importance? Which would you rank first and which last?

On the lines provided, list the three communication developments that, in your opinion, should rank above all others.

Device #1: _____

I think this was the most important development in communication because: _____

_____

_____

_____

_____

_____

Device #2: _____

_____

I ranked this device second because: _____

_____

_____

_____

_____

_____

Device #3: _____

_____

This is the device I consider the third most important because:

_____

_____

_____

_____

_____

Name _____ *Date* _____

Use Context Clues to Complete Sentences

Fill in the blanks in the sentences using the words from the word box.

animal	humans	sounds
around	language	story
daily	others	study
discuss	pain	theory
heavy	refer	times

To understand the complete _____ of communication, one would have to _____ all the way back to prehistoric _____. Yes, we must assume that prehistoric people communicated in some way. Historians and _____ think they did so through a series of grunts and gestures.

Did you ever wonder how _____ might have begun? Linguists, or people who _____ languages, believe words evolved from the sounds prehistoric people made as they went about their _____ tasks. Some of the groans they emitted while lifting _____ loads, for example, could easily have been the forerunners of words. And what about certain exclamations of _____? Such expressions as "ow" and "ouch" might have begun in this manner.

An interesting _____ as to the beginning of language is called by some the "bow-wow" theory. This is the idea that language began from _____ imitating the _____ made by animals. No, everybody did not go _____ barking, bleating, howling, or oinking at each other, but they could have eventually turned certain _____ sounds into words. A very interesting idea, wouldn't you agree?

How do you think language might have begun? _____ it with your teacher and classmates.

Answers to Activities

Chapter 1

Sentence or Fragment?

1. F 2. F 3. S 4. S 5. F
6. S 7. F 8. F 9. S 10. F

Students' sentences will vary.

Chapter 2

Interpret Some Famous Proverbs

Answers will vary.

Solve a Publishing Crossword

Across: 5. Occurrences 8. General 10. Paper 12. Four 13. Benjamin 14. Apprentice

Down: 1. Thrift 2. Poor 3. Delaware 4. Zenger 6. Cosby 7. Proverb 9. Magazine 11. Boston

Unscramble and Identify Famous Persons

1. William Berkeley—royal governor of Virginia in the early 1600s
2. John Campbell—printer who started the *Boston News Letter* in 1704
3. James Franklin—Benjamin Franklin's half–brother, whose Boston newspaper criticized members of the Massachusetts legislature
4. Benjamin Franklin—published *Poor Richard's Almanack*
5. John Zenger—printer whose trial helped bring about freedom of the press in America
6. William Cosby—royal governor whom Zenger attacked in his newspaper
7. Andrew Hamilton—Zenger's lawyer at his trial
8. Andrew Bradford—publisher of *American Magazine*
9 Thomas Paine—wrote famous essay "On Liberty," which helped bring about the American Revolution

Name Those Newspapers and Magazines

Answers will vary, but might include some of the following:

Newspapers: *Wall Street Journal, USA Today, New York Times, Los Angeles Times, Chicago Tribune, New York Daily News, Long Island Newsday, Houston Chronicle, Detroit Free Press, Dallas Morning News, Boston Globe, Philadelphia Inquirer*

Magazines: *Odyssey, Modern Maturity, Reader's Digest, TV Guide, National Geographic Magazine, Better Homes and Gardens, Good Housekeeping, Ladies' Home Journal, Family Circle, McCall's*

Chapter 3

Solve Some Pony Express Math Problems

1. 196.6; 245.75 2. 131 3. $2,475

Draw Conclusions from What You Have Read

Answers will vary but might be similar to the following:

1. People were reluctant to be critical of colonial governments.
2. Some letters might have been taken by persons to whom they were not intended.
3. It tells you that riding for the Pony Express was a difficult and dangerous job.
4. Regular paper weighed more than tissue paper. Because a rider's mail bag had to be kept light, the use of tissue paper was required.
5. Night flights were too dangerous to attempt at the time.

Arrange in Chronological Order

11, 2, 13, 8, 12, 1, 14, 4, 6, 5, 10, 7, 9, 3

Chapter 4

Fill In a Venn Diagram

Answers will vary but might be similar to the following:

Early Telephones: The mouthpiece and earpiece were separate; the telephone was mounted on a wall; all calls went through an operator.

Both: The basic principles of how telephone transmitters and receivers work have remained essentially the same through the years.

Modern Telephones: Direct-distance dialing; the receiver and transmitter are combined in one handset; portable and cellular phones are now in use.

Chapter 5

Use Context Clues to Complete Sentences

process; beginnings; artists; cameras; pioneer; film; smile; reduced; posing; comfortable; sold; produced; mere; transformed; amateur

Chapter 6

Solve a Radio Pie Chart

a. 188.16 b. 76.44 c. 29.40

Compare Radio Then and Now

Answers will vary but might be similar to the following:

1. Radio stations still feature music, news, sports, and talk shows as they did years ago.
2. Today radio stations do not air sitcoms and dramatic programs as they once did. For example, programs like "The Hornet," "The Great Gildersleeve," and "Inner Sanctum" are no longer produced for the radio.
3. Answers will vary.
4. While listening to programs, radio listeners could conjure up any images they wanted, give the characters faces, and imagine scenes however they wished.

Make False Statements True

1. Orson Welles 2. Guglielmo Marconi 3. vacuum tube 4. a superheterodyne 5. Pittsburgh 6. 1920 7. England 8. Earphones 9. batteries 10. electrical storms 11. 1948 12. World War II 13. Amateur

Chapter 7

Solve Some Movie Math Problems

1. 10 million 2. a. 199,977,000 b. 8,700 3. 17,865.25

Test Your Knowledge of New Jersey

1. northern 2. Trenton 3. New York 4. Hudson 5. Atlantic Ocean 6. Delaware and Pennsylvania 7. Newark; Jersey City and Paterson 8. 7,836 9. Rutgers 10. Trenton 11. football

Solve a Movie Crossword

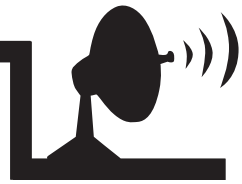
Across: 1. Flicker 4. Arcade 6. Vitascope 9. Nickel 11. Glasses 12. Jazz 13. Train

Down: 1. Fred 2. Chaplin 3. Newsreel 5. Davis 7. Cinerama 8. Hats 10. Edison

Chapter 8

Arrange Events in Chronological Order

2, 14, 6, 5, 11, 4, 3, 15, 1, 9, 13, 7, 8, 12, 10



Complete a Word Search

P I R H A X L A B O R A T O R Y T R K
T H C R O C D A E G H P J K L M N O E
P Q O R T R A N S I S T O R S T J U A
V W M N X Y N R T E Z C D R G F U M R
H J P L O K M N E P R S T T T R K R P
C C A A D G D O R C H E S T R A E X H
Z K C Z T L R G E E O G H J M N B L O
B B T C C E D A Q D E R T W K K O L N
F C D X Z P N R P S P L D A A H X H E
A E I O N B B T H H C H J L P K L N S
C A S S E T T E O B D X Z K S E C D M
O M C X E B D C N Z S D K M R N P S A
N P P Y D C F D I A P H R A G M H J A
C L N X L Z B D C X V Z K N F A A S G
E I D R E I S T M U S I C B D C T S N
R F B C R I N S T R I E D I P H O N E
T I K S O U N D C D E F G E H I K L T
M E N P Q R S P E A K E R V O N W X I
Y R Z V A I M I C R O P H O N E U V C

Recall Important Facts

Answers should resemble the following:

1. A needle recorded sound onto a cylinder covered with tinfoil. The recording was heard by turning a crank to make the cylinder move.
2. It turned at a much slower speed.
3. The electric microphone made it possible for every instrument in an orchestra to be recorded accurately.
4. Both devices record and save information that can later be used by a listener.
5. Impressions on a disc are read by a light from a miniature laser; scratches do not affect a CD's sound quality.
6. The use of amplifiers, wide-range speakers, and sensitive needles to improve sound quality.

Chapter 9

Solve Some Television-Related Math

1. 18; 20 2. 9; 20 3. Answers may vary.

Chapter 10

Solve a Computer Puzzle

1. ENIAC 2. transistor 3. modem 4. ARPANET 5. vacuum 6. circuit 7. Aiken 8. Internet

Interpret a Bar Graph

1. 1994–1996 2. 1988–1990 3. 20 million 4. 32 million 5. 1988 to 1996

Chapter 11

Fill In a Venn Diagram

Answers will vary but should be similar to the following:

Burt's Typographer: It was encased in a box; each letter had to be rotated into the proper position before typing; an arm was turned to print a letter on paper.

Both: Both were awkward devices that were not easy to use.

Sholes's Typewriter: A foot treadle moved the carriage; each letter, number, and mark had its separate key; eventually it had such features as a shift key and backspace lever.

Solve Some Word Problems

1. 505.75 2. 2,194.17 3. 30

Use Context Clues to Complete Sentences

story; refer; times; others; language; study; daily; heavy; pain; theory; humans; sounds; around; animal; Discuss

Additional Resources

Books for Children

Dixon, Malcolm. *Communications*. New York: The Bookwright Press, 1991.

Jacobsen, Karen. *Television*. Chicago: Childrens Press, 1982.

Lafferty, Peter, and Julian Rowe. *The Inventor Through History*. New York: Thomas Learning, 1993.

Mackie, Dan, and Paul Hayes. *Communications*. Niagara Falls, New York: CHP Books, 1987.

Smith, Brian Reffin. *Computers*. London: Usborne Publishing, 1981.

Steffens, Bradley. *Photography: Preserving the Past*. San Diego: Lucent Books, 1991.

Books for Adults

Bender, Lionel. *Invention*. New York: Alfred A. Knopf, 1991.

Bunch, Bryan, and Alexander Hellemans. *The Timetables of Technology*. New York: Simon and Schuster, 1993.

Discovering America's Past. Reader's Digest, 1993.

Great Scientific Achievements: The Twentieth Century. The Editors of Salem Press. Pasadena: Salem Press, 1994.

Gregory, James, and Kevin Mulligan. *The Patent Book*. New York: A & W Publishers, 1979.

Leuchtenburg, William E., and the Editors of *Life*. *The Great Age of Change*. Volume 12, *The Life History of the United States*. New York: Time, 1964.