Have you ever noticed when you step into an elevator that next to the buttons showing the floor numbers, there are small plates with a series of raised dots and bumps? Did you ever wonder what those bumps and dots mean and why they are there? When you run your fingers over those plates, you feel the ridges. When blind people touch them, they read the floor numbers. In a grid of six bumps, with two across and three down, a configuration of two raised bumps across the top and one down on the right side is the number 4; one dot on the top left side and two across the middle is the number 8.

Who invented this elaborate setup of bumps and dots that comprise an entire alphabet and numerical system that allows blind people to read with their fingers? Was it a distinguished scientist, or a brilliant author, or perhaps a famous artist?

Actually, this system, which is called braille, was created by a blind 12-year-old French boy and was named for him. Louis was not always blind. He became blind by accident. Louis Braille was born on January 4, 1809 in a small country village near Paris called Coupvray. His father was a leather worker who made harnesses and other leather goods. One day, when he
was just three years old, Louis was in his father’s leather workshop. Like many young children, Louis enjoyed imitating his father. He was fiddling with an awl, a small tool with a round wooden handle and a sharp, pointed metal tip that is used to punch holes in leather. While he was playing, the awl slipped and poked Louis in the eye. A doctor treated the wound as best he could and patched the eye. But the eye became infected, and the infection spread to the other eye. Within a short time, young Louis was totally blind in both eyes.

In those days, many blind people became beggars or performers in sideshows. But Louis’s parents refused to allow their son’s disability to get in the way of his studies or his life. Louis attended school like his brothers and sisters, relying on his creativity, intelligence, and drive to overcome obstacles. To help him navigate the village, his father made him canes. The local priest taught him to use his other senses to learn: his hearing to distinguish the calls of different birds, and his sense of smell to identify different plants and flowers. Louis was one of the brightest students in his school.

In 1819, at age 10, Louis earned a scholarship to attend the Royal Institute for Blind Youth in Paris, the first school in the world devoted to blind children. For Louis, going to the school meant leaving his family and the village he knew well, where he felt safe. But Louis and his family knew the school offered him the best opportunity to get an education and lead a successful life. There he excelled in studying history, math, science, and grammar, but he proved especially gifted at music. Louis became an accomplished pianist and organist. He even got a paid job as an organist, playing in a small church near the institute.

The students at the school learned most of their subjects by listening to lessons. But there were a few books that the school’s founder, a man named Valentin Hauy, had developed by printing raised, or embossed, letters. Reading that way was slow, and the books were large and heavy. But they were the only books available then for blind people. Louis Braille began to wonder: wasn’t there a better way to allow blind people to read?
One day Louis learned about the work of a former French army captain named Charles Barbier. Captain Barbier had invented something called “night writing,” a code of 12 raised dots and dashes that allowed soldiers to communicate with one another at night without using lights that would alert the enemy to their location. The soldiers could “feel” the messages with their fingers, and keep safe. The code turned out to be too complex for the soldiers, but it inspired Louis Braille. Louis simplified the system, reduced the series of dots from twelve to six and eliminated the dashes. By the time he was 20, Louis published his first alphabet for the blind, a system he continued to work on and perfect.

And how did Louis create the dots he used in his revolutionary new system? He used an awl. The very tool that caused his blindness became the instrument that brought the opportunity for reading to Louis and generations of blind people to this day.

The world was slow to accept Louis Braille’s innovation. Indeed, during his lifetime, his method was not widely accepted. Louis Braille died at the young age of 43 from tuberculosis, a devastating respiratory disease. He was buried in his home village of Coupvray.

In time, Braille’s method became accepted around the world. “Braille” alphabets were created in languages spanning the globe. Today, we find them not only on elevator plates, but also on computers and cell phones. And the name Louis Braille stands for innovation, courage, and determination.
1. What did Louis Braille invent?
   A) “night writing,” a code that allows soldiers to communicate in the dark
   B) the modern piano and the organ
   C) the awl, a tool that is used to punch holes in leather
   D) an alphabet that allows blind people to read with their fingers

2. What does the author describe in the passage?
   A) the founding of the Royal Institute for Blind Youth in Paris
   B) how Louis Braille overcame the challenges posed by his blindness
   C) the history of blind people in France
   D) how Valentin Haüy created the first book for the blind

3. Louis Braille did not let his blindness hold him back in life. What evidence from the text supports this statement?
   A) “For Louis, going to the school meant leaving his family and the village he knew well, where he felt safe.”
   B) “To help him navigate the village, his father made him canes.”
   C) “Louis became an accomplished pianist and organist. He even got a paid job as an organist, playing in a small church near the institute.”
   D) “Louis Braille died at the young age of 43 from tuberculosis, a devastating respiratory disease.”

4. Based on the passage, what might be one reason that Louis proved to be a gifted musician?
   A) Priests trained him to sing as a boy.
   B) He inherited musical talent from his father, who was also a musician.
   C) The Royal Institute for Blind Youth is a strong music school.
   D) He had to rely on his hearing after going blind.

5. What is this passage mostly about?
   A) the invention of braille
   B) the use of the awl in leatherworking
   C) the Royal Institute for Blind Youth in Paris
   D) Captain Barbier and “night writing”
6. Read the following sentence: “Who invented this **elaborate** setup of bumps and dots that comprise an entire alphabet and numerical system that allows blind people to read with their fingers?”
What does “elaborate” mean?

A) simple  
B) decorated 
C) complicated  
D) educated

7. Choose the answer that best completes the sentence below.
   _________, Louis Braille’s alphabet for the blind was not widely accepted, but today braille is used around the world.
   
   A) Even though 
   B) Initially 
   C) As a result  
   D) Certainly

8. How did Louis Braille go blind?

   ____________________________
   ____________________________
   ____________________________
   ____________________________

9. The books developed by Valentin Hauy were problematic. They were large and heavy, and reading them was a slow process. What was Louis Braille’s response to the problems with these books?

   ____________________________
   ____________________________
   ____________________________
   ____________________________

10. An awl both helped and hurt Louis Braille. Explain this statement using evidence from the passage.

    ____________________________
    ____________________________
    ____________________________
    ____________________________
system

Definition

noun

1. a group of things or parts that work together as a whole.
   This is a large school system.

2. a particular way or method of doing something.
   He's got a system for getting his office work done.
   We need a better voting system.

Advanced Definition

noun

1. a group of related things or parts that function together as a whole.
   There are twelve elementary schools in our city's school system.

2. a human or animal body as a unit.
   toxic substances in his system.

3. an ordered set of doctrines, ideas, or principles.
   a system of ethics.

4. a particular method of procedure, organization, or classification.
   The books are organized according to a system.
   The people are demanding a new system of government.

5. organized, orderly methods; orderliness.
   The project needs system in order to succeed.

Spanish cognate

sistema: The Spanish word sistema means system.

These are some examples of how the word or forms of the word are used:

1. The next time Jason went to Ho Tep Wildlife Reserve, on a camping trip with his dad, he made a point of observing the wildlife. He spent twenty minutes watching a copperhead snake slither across the forest floor, wondering about its role in the larger system.

2. She also became a hero and an inspiration to people all over the nation who were fighting for racial equality, including Dr. Martin Luther King, a young pastor who would soon become a major civil rights leader. In response to Rosa's arrest, blacks in the city of Montgomery boycotted the public bus system for more than a year.

3. New York City is one of the densest cities in the world, with millions of people squeezed into a mere 303 square miles. Although it has the world's largest subway system, traffic can still be quite bad, particularly at rush hour.

4. When negative feedback occurs, an original effect is diminished. Both positive and negative feedback loops can occur in all kinds of Earth systems, not just in a system related to the climate. For example, the relationship between different species of animals is a kind of system as well. Periodically, the populations of certain animals will wax and wane.

5. This has been the largest environmental conservation project in the history of the United States. Much of it is designed to reverse engineer the canal system that was built in the 19th and mid 20th centuries. Ecological indicators are showing some improvements. The crayfish population is up. Wading and migratory birds have improved their nesting habits.

6. Shasta Dam isn't the only dam in the area. It is just one part of the Central Valley Project, a huge system of dams and reservoirs that provides water to the farms in the Central Valley. This water system was initially conceived of in the 1870s, after people moved to the area in the 1850s. People flocked to California because of the gold rush, hoping to get rich by mining for gold.

7. Scientists believe that gold was formed by explosions in space. Dusts that contained metals, including gold, were spread by these explosions throughout the galaxies until they condensed into the solar system and planets where we now live. Because the core of the earth was hot and molten when the planet formed, almost all of the gold sank into the earth's core where we cannot reach it.

8. Hundreds of different species of coral make up the various structures composing the Great Barrier Reef. Within these structures, several ecosystems flourish. Ecosystems are complex systems that contain several species that interact with one another.
Alexander Graham Bell was in his laboratory, working on a device that would allow people to talk to one another through wires, even when they were not in the same room, or even the same city. Today, we take for granted that we can communicate in real time with people around the corner and around the globe. But in the 1870’s, when Bell was experimenting with his new project, such an idea was like a fantasy.

On March 10, 1876, that fantasy came to life. It is unclear what exactly unfolded that day, but one story says that while working on his voice transmitter, Bell accidentally knocked over a bottle of transmitting fluid, burning his skin. Instinctively, he called out to his assistant, Thomas Watson, to come help: “Mr. Watson. Come here. I want to see you.”

Watson heard those words and was startled. They had come crackling across the earpiece of what the two inventors had labeled the telephone. The experiment was successful. It was the first telephone call.

Alexander Graham Bell’s interest in communications devices traced back to his childhood in Edinburgh, Scotland. He was born on March 3, 1847 to a father who was an expert in speech production and a mother who was a gifted pianist despite being profoundly deaf. The perseverance and success of his mother in the face of such adversity taught young Alexander that problems were surmountable and that he could help people to overcome them.
From a young age, Alexander’s curiosity propelled him to find solutions to problems. When he was 12 years old, he came up with his first invention. While playing in a grain mill with a friend, he was frustrated by the lengthy time it took to remove the husk from the wheat grain. He went home, thought about it, and created a gadget that used rotating paddles and nail brushes to strip the husk off the grain. It was the first of dozens of varied devices that Bell would invent.

Bell’s curiosity and ingenuity were nurtured by his grandfather, a teacher of speech and elocution. When Bell was 15 years old, he went to live with and care for his grandfather, who was aging and ailing. The two grew very close, and the grandfather encouraged Alexander to pursue his inventive streak.

In 1870, the Bell family’s life changed rather abruptly when they moved to Canada. Bell’s two older brothers had died of tuberculosis, and Alexander’s health had been failing, too. His parents were convinced that America would be a healthier environment and moved, first to Ontario, Canada, then to Boston. Bell thrived. His health improved. Eventually, he began to tutor deaf students in Boston.

The parents of two of his students were excited by Bell’s idea to invent a device that transmitted multiple signals over a single wire. One of the parents learned, however, that another inventor, Elisha Gray, was working on a very similar project at the same time. To encourage Bell and to help rush his work along, the parent hired an electrician by the name of Thomas Watson to be Bell’s assistant. He hoped that between Bell’s clever ideas and Watson’s practical skills, the two men would succeed quickly. However, instead of focusing on a multiple-signal transmission device, Bell and Watson focused much of their time on a device to transmit the human voice over wires. To protect their experiment, Bell and Watson’s voice-transmitting device was registered with the United States patent office. Lewis Latimer, another inventor, helped Bell by drafting the drawings of the device for the patent. The patent was
well timed: Gray attempted to file for his own “telephone” the very same day, but he was turned away because the idea was already protected and owned by Bell and his supporters.

On that March morning in 1876, Bell’s dream was achieved when the words “Mr. Watson. Come here. I want to see you” traveled from the room Bell was in to the room Watson was in across telephone wires. The two men took their incredible telephone device on the road, demonstrating its proficiency in city after city. The year after his telephone came to life, Bell married Mabel Hubbard, one of the deaf students whose fathers supported Bell’s dream of inventing the telephone.

Bell was challenged dozens of times in lawsuits by people trying to discredit his patent, especially by other inventors who claimed to have invented the telephone before him. He won every time. Bell created the Bell Telephone Company, and in the first 10 years of its existence, telephone ownership in the United States grew to more than 150,000 people. Bell improved the device over the years. For example, he added a microphone that amplified the voice. He also went on to invent and patent many other devices that would have pleased his mother because of the way they helped people to solve problems.

When Bell died on August 2, 1922 in Nova Scotia, Canada, the entire telephone system was shut down for one minute in tribute to the man who revolutionized communications.
Name: ___________________________ Date: __________________

1. How did Alexander Graham Bell revolutionize communications?
   A) He invented the telephone.
   B) He invented the hearing aid.
   C) He invented the grain mill.
   D) He invented the television.

2. What does the author describe in the passage?
   A) how Bell’s mother overcame her difficulties
   B) why Bell chose to tutor deaf students
   C) how the telephone was invented
   D) the rules of the United States patent system

3. Bell and Watson were not expecting the telephone to work the day that the first telephone call was made. What evidence from the text supports this conclusion?
   A) “But in the 1870’s, when Bell was experimenting with his new project, such an idea was like a fantasy.”
   B) “Watson heard those words and was startled. They had come crackling across the earpiece of what the two inventors had labeled the telephone.”
   C) “Alexander Graham Bell was in his laboratory, working on a device that would allow people to talk to one another across wires, even when they were not in the same room.”
   D) “It is unclear what exactly unfolded that day, but one story says that while working on his voice transmitter, Bell accidentally knocked over a bottle of transmitting fluid, burning his skin.”

4. If Bell had not invented the telephone, what would probably have happened?
   A) Someone else would have registered a similar device with the United States patent office.
   B) The modern telephone would not have been invented for another hundred years.
   C) Mabel Hubbard would have married Watson instead of Bell.
   D) The parents of Bell’s deaf students would have hired someone to replace Watson as Bell’s assistant.
5. What is this passage mostly about?
   A) the life of Thomas Watson, Alexander Graham Bell’s assistant
   B) the challenges faced by deaf people
   C) the invention of the telephone
   D) Alexander Graham Bell’s childhood in England

6. Read the following sentence: “The perseverance and success of his mother in the face of such adversity taught young Alexander that problems were surmountable and that he could help people to overcome them.”
   What does “surmountable” mean?
   A) able to be solved
   B) able to be warmed up
   C) able to fly
   D) able to survive underwater

7. Choose the answer that best completes the sentence below.
   Elisha Gray attempted to file a patent for his telephone design; _______, the idea had already been patented.
   A) moreover
   B) as a result
   C) however
   D) later on

8. At what age did Alexander Graham Bell come up with his first invention?

9. Why did Alexander Graham Bell begin inventing?
10. How did Alexander Graham Bell’s childhood and upbringing influence him as an inventor?
communication  com·mu·ni·ca·tion

Definition

noun

1. the sharing or exchange of messages, information, or ideas.

Reading and writing are important forms of communication.

E-mail is a new means of communication.

Advanced Definition

noun

1. the transferring of messages or exchanging of information or ideas.

2. a specific transferred message.

3. (pl.) means of transferring messages, such as telephone, telegraph, television, radio, and the like.

Spanish cognate

comunicación: The Spanish word comunicación means communication.

These are some examples of how the word communication can be used.

1. The Internet is a communications system that connects computers around the world.

2. Industrial advances allowed for the development and expansion of new industries, like transportation (roads, canals, and railroads), communications (magazines and newspapers), and finance (banking and insurance).

3. Communications and commerce are global; investment is mobile; technology is almost magical; and ambition for a better life is now universal. We earn our livelihood in America today in peaceful competition with people all across the Earth.

4. Only a man practiced in multi-tasking and skilled in both adult and child communication, could deliver a tour of his home while playing with a stuffed pig. He's quick and makes quips you can't stop to think about, unless you don't mind missing the next one.
**inventive**  in·ven·tive

**Advanced Definition**

**adjective**

1. adept at thinking up new ideas or at devising new objects or methods; imaginative.
2. of or relating to invention.

**These are some examples of how the word or forms of the word are used:**

1. Zany, playful, and inventive: Many people describe Jack Prelutsky’s poems for kids that way.
2. The two grew very close, and the grandfather encouraged Alexander to pursue his inventive streak.
3. Working from the Jet Propulsion Laboratory (JPL) in California, their team introduced the world to one of the most daring, inventive feats of engineering the world had ever witnessed: the pinpoint landing of NASA’s Curiosity rover on Mars.
**patent**  pat·ent

**Definition**

*noun*

1. a government grant that gives someone the right to make, use, or sell an invention. A patent is given for a certain number of years.

   *He got a patent for the toy he designed.*

*verb*

1. to get a patent on.

   *The engineer patented her invention.*

**Advanced Definition**

*noun*

1. a government grant to an inventor, giving for a specified period the exclusive right to make, use, or sell an invented device, process, or the like.

   *The inventor has applied for a patent.*

2. the device, process, or the like that is thus protected.

3. any of several other rights granted by government, as to the ownership of land previously in the public domain.

*adjective*

1. of, concerning, or protected by a patent or patents.

   *You should consult a patent attorney.*

   *We use a patent device to handle this problem.*

2. very noticeable; obvious.

   *What he's saying is just patent nonsense.*

*transitive verb*

1. to secure a patent on.

   *The engineer patented his invention.*
2. to grant a patent on.

_The government patented her device._

**Spanish cognate**

*patente*: The Spanish word *patente* means patent.

**These are some examples of how the word _patent_ can be used.**

1. Patented the telephone, which revolutionized communication, at the age of 29.

2. According to the United States Patent Office, over 4,000 people have tried to invent a better mousetrap.

3. The CAT scan machine was patented. Doctors use CAT scans to take detailed 3-D pictures of the inside of the body.

4. Tru Fire is Lavallee’s patented airbrush technique for painting flames that look real. He came up with the idea in 2000 when a guy at a car show wanted Lavallee to paint flames on his car--flames that looked real.

5. He won several patents on space-related inventions and also founded the ShareSpace Foundation, whose stated mission is to "share the wonders of space with children of all ages and to foster affordable space travel opportunities for all people."

6. By 1902, the Wright brothers were piloting hundreds of well-controlled glider flights (between September and October of 1902, they made between 700 and 1,000 glides). They finally felt confident enough to patent their "three-axis control" system. And they were ready to add engines to the equation.

7. In an unusual move, Franklin never patented a single one of his designs or inventions, which meant other people were free to copy them, improve upon them or re-create them. He resisted hoarding his ideas because he truly believed that people benefitted from one another's inventions. It gave society an advantage if new designs and inventions were available to all, because that way, more minds could work on them in order to make them better.
transmitter  trans·mit·ter

Definition

noun

1. the apparatus that makes and changes radio waves in order to send them out as radio or TV signals.

   We could not watch Channel 4 because their transmitter was broken.

Advanced Definition

noun

1. the broadcasting apparatus that generates, amplifies, and modulates radio waves and sends the signal thus produced from an antenna.

2. the part of a telephone or telegraph that changes sound waves or mechanical movements into electrical impulses than can be conveyed to a receiver.

3. anything that transmits.

Spanish cognate

transmisor: The Spanish word transmisor means transmitter.

These are some examples of how the word transmitter can be used.

1. After Springer had recovered, scientists decided that they should return the orca to the ocean. Before releasing her, they attached a radio transmitter to Springer. The radio allows scientists to track her.

2. A concussion harms the neurons (nerve cells) of the brain. It damages their axons, or filaments. It also throws neurotransmitters out of balance. Neurotransmitters are chemicals released by neurons that send messages from one neuron to the next.

3. Muslims believe that the words in the Qur'an are the teachings of God as told to Muhammad through the angel Gabriel, messages that were transmitted over the course of about twenty-three years, beginning during that important prayer retreat in 609 CE.
4. Both rods were made from metal, which Franklin theorized would conduct the electricity of the lightning. By moving from the first rod down the length of the wire, the lightning's energy could be safely transmitted into the ground, where it would no longer pose a threat to one's home or body.

5. For example, when Proust tasted his cookie, the sense receptors on his tongue sent a message to his brain telling it how the madeleine tasted. The messages are signals transmitted along nerve cells until they reach the brain. When the brain receives these signals, it processes them, and controls the body's reaction to them.
Paired Text Questions

Part 1: Use the article “Alexander Graham Bell” to answer the following questions:

1. Alexander Graham Bell completed the "first telephone call" on March 10, 1876. Describe the first telephone call.

2. What are two character traits that Alexander Graham Bell possessed? Use evidence from the text to support your answer.

Part 2: Use the article “Louis Braille” to answer the following questions:

3. Louis Braille invented a system of bumps and dots called braille. What does braille allow blind people to do?

4. What are two character traits that Louis Braille possessed? Use evidence from the text to support your answer.

Part 3: Use the articles “Alexander Graham Bell” & “Louis Braille” to answer the following questions:

5. How were Alexander Graham Bell and Louis Braille similar? Make sure to address their character traits in your answer. Use evidence from both texts to support your answer.

6. What are three character traits that make a good inventor? Use evidence from both texts to support your answer.