

Learning A–Z

level **Z**

Multi-level

T W Z

Grade

5

Word Count

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Lexile

1070L

Nonfiction • Biography

Refer to the Focus Question on page 2 of this title to guide discussion and support additional learning connected to the text.

Albert Einstein is a biographical text about the accomplishments of the renowned scientist. Readers learn about his theories that changed the way people think about the universe. Information about Einstein's hobbies, struggles, and opinions allows readers to gain insight into the personal side of his character. Famous quotes begin each section, and photographs and diagrams support the text. The book is also available for levels T and W.

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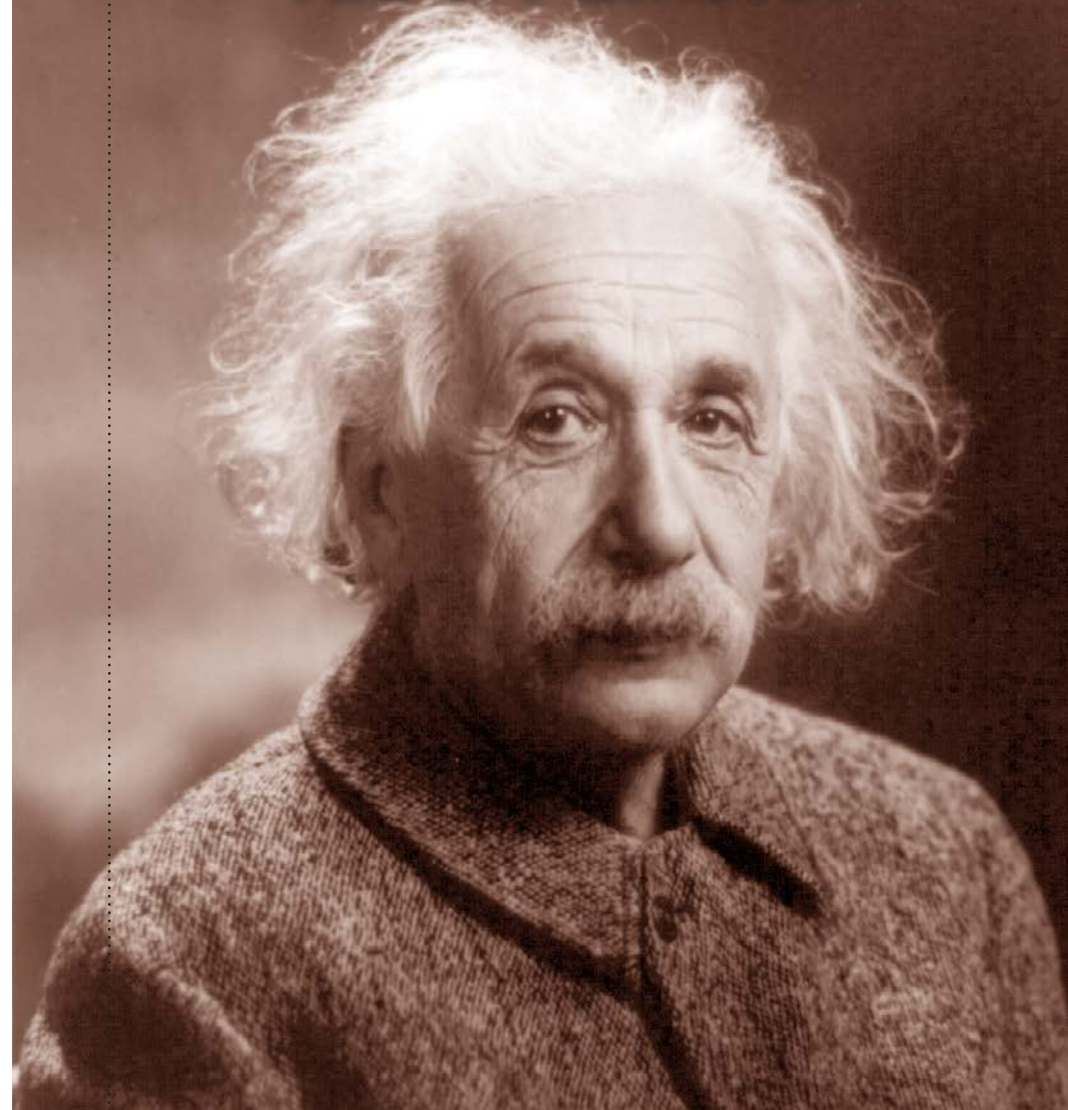
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Albert Einstein

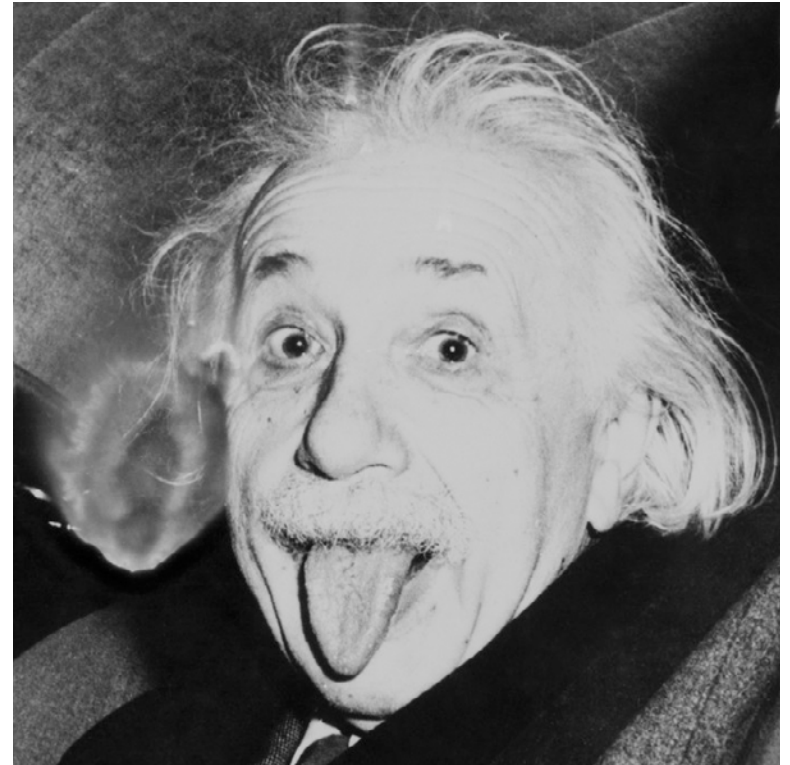


Written by Michael Emerson

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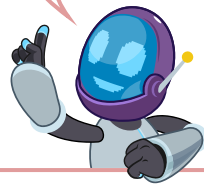
Albert Einstein



Written by Michael Emerson

Focus Question

How can our experiences and our curiosity about things shape our life?



Words to Know

advocated	nationalism
algebra	patent
atoms	physics
compass	pore
influential	prestigious
molecules	revolution

Glossary

advocated (*v.*) page 16
supported or recommended

algebra (*n.*) page 6
a branch of math in which symbols, usually letters, are used to represent unknown numbers

atoms (*n.*) page 10
tiny pieces of matter

compass (*n.*) page 4
a direction-finding tool with a needle that always points north

influential (*adj.*) page 13
having the power to shape events

molecules (*n.*) page 10
the smallest parts of a substance that are still identifiable as that substance

nationalism (*n.*) page 16
the belief in the success and independence of one's own nation

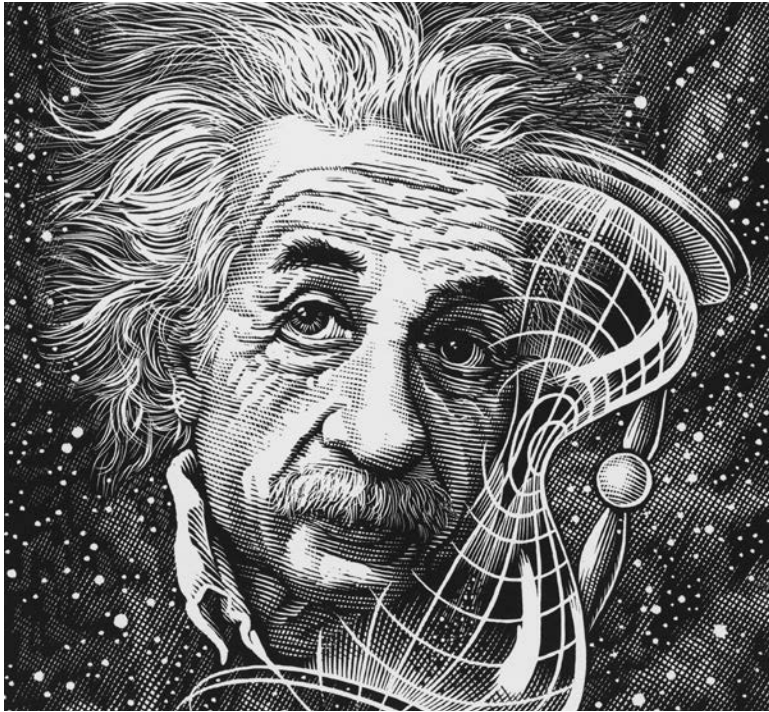
patent (*n.*) page 8
a document that grants an inventor the right to make money from an invention

physics (*n.*) page 11
the scientific study of matter and energy

pore (*v.*) page 6
to read with great attention

prestigious (*adj.*) page 14
having honor, respect, or high standing

revolution (*n.*) page 13
an overthrow of previous ideas or ways of doing things



A Life Well Lived



"The important thing is to never stop questioning."

Einstein once said, "The most beautiful experience we can have is the mysterious. . . . It is enough to try to understand a little of this mystery every day."

Until his death on April 18, 1955, Einstein's curiosity led him to work to understand nature's greatest mysteries. In doing so, he changed the way people think about time, space, energy, and matter—the foundations of the universe.

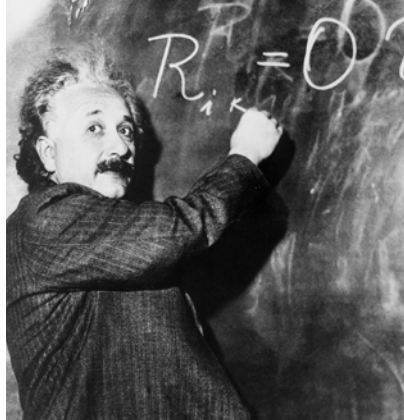
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Deeply Hidden Things

When Albert Einstein was five years old, his father, Hermann, showed him a magnetic **compass**. Watching its floating movement aroused his curiosity. What caused it to behave the way it did? Why did the compass's needle stay almost still while his father turned the casing around and around in his hand? Why did the needle always point north, as though an invisible hand controlled it?

Einstein was too young to understand the answers, but he never forgot the feeling of wonder and mystery. Later, he wrote that watching the compass had taught him an important lesson, that "something deeply hidden" had to be "behind things." That curious little boy grew up to become a curious scientist who spent his life trying to identify that "something." By continuing to pursue his curiosity, Albert Einstein forever changed the way people think about the universe in which we live.



Einstein's curiosity about complex problems led to great discoveries.



Einstein's theories provide scientists with a framework to study space objects, such as the Helix Nebula.

Einstein's scientific ideas continue to influence new theories and technologies. Current ideas about the origins of the universe, the nature of space and time, and strange, intriguing objects called black holes are all the result of Einstein's work and original thinking. Einstein's discoveries and equations provided the foundation for scientists to comprehend many aspects of the universe. Scientists have only recently been able to test and confirm some of Einstein's most advanced theories.

Einstein's Influence



"Few are those who see with their own eyes and feel with their own hearts."

Einstein's curiosity led to the creation of many useful products. For example, Einstein's ideas about the nature and behavior of light led scientists to develop new ways



to control light, and these new technologies eventually led to the production of television cameras, remote controls for home electronics, and flat-screen computers.

Einstein was also the first person to think of laser light, a technology that is now used in compact discs (CDs), digital video discs (DVDs), and store checkout equipment. His proof of the existence of atoms and molecules led to the creation



or improvement of a wide range of products, including shaving cream, toothpaste, personal computers, and cell phones.



Einstein played the violin from childhood through adulthood.

A Talented, Curious Boy



"A table, a chair, a bowl of fruit, and a violin; what else does a man need to be happy?"

Albert Einstein was born on March 14, 1879, in the small town of Ulm, Germany. The next year, the family moved to the larger city of Munich, where Albert's younger sister, Maja, was born. Maja would become his closest childhood friend.

Einstein's entire family had a strong influence on his life. His mother, Pauline, played the piano, and shared her love of music with him, encouraging him to take up the violin. Although he disliked the required structure of his lessons, he found that he loved playing the violin. His violin would be a constant companion for the rest of his life.

Do You Know?

As a child, Einstein had a common childhood speech habit that worried his parents. Whatever the young Einstein said aloud, he would often repeat to himself, in a very quiet voice, as if rechecking his words to see if they were correct. He eventually grew out of this unique habit and became an accomplished public speaker.



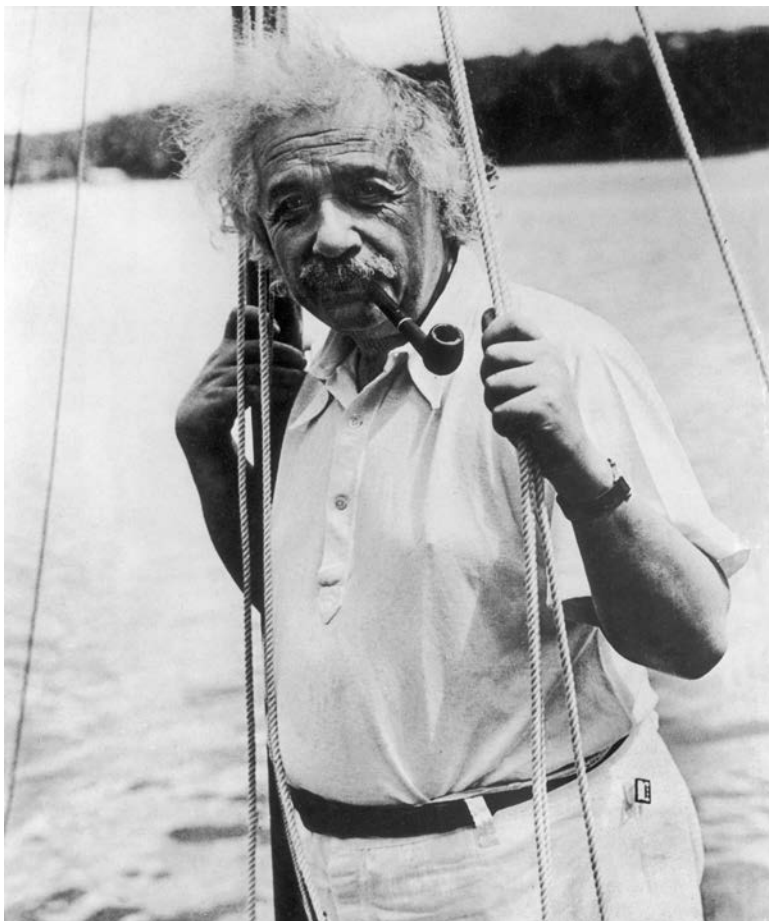
Albert Einstein with his sister, Maja

Einstein's father and two uncles were electrical engineers. They introduced Einstein to math and science at an early age and taught him the basics of **algebra** by making it into a game. A medical student who came to dinner once a week brought him science, math, and philosophy books, and Einstein would **pore** over the books for hours at a time. He was especially enthralled with a book about geometry, although the books about philosophy also helped shape him. Even as a child, Einstein had the ability to concentrate deeply, and would pursue complicated problems until he was satisfied that he had considered every solution.

For the next 22 years, Einstein continued working to expand his ideas into new areas. Some people thought his efforts showed that he was losing touch, but Einstein didn't pay much attention to this criticism. He believed he could develop a new theory that would unify his ideas with the latest theories. He remained dedicated to his work and his ideas, yet he never achieved the sort of breakthroughs he'd had during the "miracle year" or with his general theory of relativity. Always in demand, he continued to give speeches, write articles, and meet regularly with fellow scientists.



Albert Einstein goes over matters with secretary Helen Dukas, who worked with Einstein from 1928 until his death in 1955.



Einstein enjoyed sailing and often took his boat out on Princeton's Lake Carnegie.

In New Jersey, Einstein moved his family into a house close to his office. They soon became part of Princeton's close-knit community. When out-of-town visitors wanted to know where the great man lived, townspeople would ask, "Are you expected?" This question prevented strangers from bothering Einstein at home.

In school, Einstein's talent for math and science was apparent immediately; however, so was his individuality. To young Einstein, the teachers seemed like army sergeants who only drilled their students to memorize information and lifeless facts instead of encouraging them to think independently and seek new answers. Einstein preferred his own brand of creative thinking. His objections in class caused disruption. Eventually, one of his teachers suggested that he leave the school altogether because his attitude was diminishing the class's respect for the teacher.

Both Einstein and his teachers were relieved when he finally left this school at 15 to join his parents in Italy. The family had moved there to start a new business, but shortly after they settled in Italy, Einstein moved again, this time to finish school in Switzerland.

When he was only seventeen years old, Einstein was accepted at one of the finest scientific universities in Europe. He often skipped routine lectures to spend more time in a laboratory developing his own ideas. Most of his university professors agreed that their brilliant young student might have a very bright future if only he would learn to follow established rules.

The Patent Office

Einstein had trouble finding a job after finishing school in 1900. Certainly, he had been an unquestionably bright student, and he had graduated from one of the finest universities in Europe. However, his strong sense of independence and curiosity had made him unpopular with the very teachers who could have helped him find the work he desired. A teaching position would have given him the freedom to pursue further study. Dismayed, but not discouraged, Einstein didn't give up. He had ideas he wanted to think through and test. He just needed to find the time and place to pursue them.

Einstein found both the time and place in 1902, when he took a job as a clerk in a **patent** office, in Bern, Switzerland. His unusual job was to make sure that devices submitted for patent certification worked the way their inventors claimed.

The job in the patent office allowed Einstein to do what he did best—pursue his curiosity and question. On his first day at work, Einstein's boss told him, "When you pick up an application, think that anything the inventor says is wrong."

Coming to America

Despite the efforts of Einstein and others to promote peace, Germany moved closer to war in the 1930s. Until this time the German government had tolerated Einstein, his fame, and his criticism of their plans, but Einstein knew this tolerance would not last. The Nazi Party was on the rise. In addition to Einstein's vocal criticism of Nazi politics, his Jewish heritage made him a target. In 1933, following a series of annual lectures in the United States, Einstein sailed to Belgium and chose to formally give up his German citizenship.

Without returning to his home in Germany, Einstein accepted a position with the Institute for Advanced Study in Princeton, New Jersey, in the United States. In reaction, German military troops seized much of his property, publicly burned



many of his papers and books, and denounced him as a traitor.

Einstein meets with Jawaharlal Nehru, prime minister of India, at Einstein's home in Princeton, New Jersey, in 1949.



News reporters greet Albert Einstein and Elsa, his wife, arriving in New York in 1921.

When Einstein came to the United States, he saw that Black people did not have the same rights or opportunities as other citizens. He became a vocal activist and spoke out against prejudice.

Many of Einstein's views changed over the course of his life. However, his strong belief in pacifism—the idea that violence and war are never the answer—remained consistent. He **advocated** a world government over **nationalism**. He used his fame to promote the idea that people, no matter where they lived or what they believed, should not harm one another.



"Try not to become a man of success but a man of value."

Do You Know?

Einstein himself held several patents. One patent was for a compass that was not affected by the presence of large amounts of iron. The compass became standard equipment on metal ships and submarines. He also held a patent for a quieter, safer pump for refrigerators.

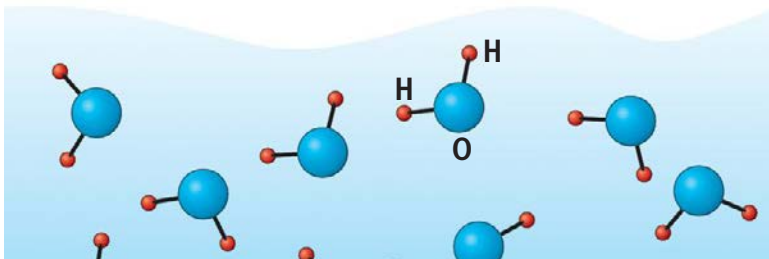


The security of a reliable salary and regular working hours gave Einstein the freedom to work on his own ideas. In his spare time, he met with a group of friends who shared his curiosity about the scientific ideas of the day, as well as about developments in philosophy and mathematics. They called themselves the Olympia Academy, and their enthusiastic exchanges often went on until late in the evening, as they talked and socialized in cafes or in Einstein's apartment. It was during those years of steady work and strong friendships that Einstein began to develop ideas that would change science forever.

The Miracle Year

By 1905, Einstein had worked in the patent office for three years, and during that time, his thriving curiosity had led him to research, study, and give a great deal of thought to new scientific theories. He soon felt confident enough in his results to share the ideas he had developed.

Einstein sent papers explaining his ideas to the leading German scientific journal of the time, *Annalen der Physik*. The journal published the first of these papers in March 1905, and four additional papers soon followed. Einstein's first paper explained his ideas about the nature and behavior of light. In the second and third papers, he proved the existence of tiny parts of matter, called **molecules** and **atoms**, and described how they moved. His final two papers offered new explanations for understanding the relationships existing among space, time, and objects in motion.



Einstein proved the existence of molecules and atoms; it is now common knowledge that water molecules contain two hydrogen atoms and one oxygen atom.

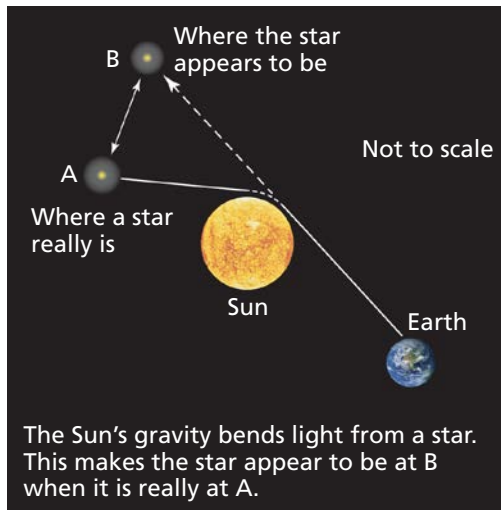
The Uses of Fame

As Einstein's fame grew, so did the demand for interviews, photographs, speeches, and writings. Einstein had mixed feelings about all this attention. These demands on his time interrupted his research. Despite his concerns, Einstein also knew that fame could open more minds and allow him to bring his ideas to wider audiences.

Einstein used his fame to draw attention to issues he cared about. One of Einstein's most deeply held beliefs was that war should be avoided if at all possible. In 1914, he was one of only three scientists who signed a letter speaking out against German militarism and against the country taking part in World War I. More than 100 scientists had signed a letter supporting Germany's entry into the war.

Einstein actively participated in antiwar efforts, publicly supporting international groups working for peace. He wrote often about his antiwar beliefs. When magazines in the United States credited Einstein with helping create the atomic bomb, he pushed back. Although his scientific discoveries were used by others to create the bomb, Einstein did not participate in the project. He actually signed a letter to President Franklin Roosevelt warning of the bomb's potential for destruction.

Despite his success and the wide acceptance of his theories, not everyone was pleased with Einstein. Many scientists had built their careers on



ideas that Einstein disproved, and others did not want to believe Einstein's theories because they would be difficult to test in a laboratory. Some people simply disliked Einstein because he was a Jewish man living in a country where prejudice against many groups of people was growing. Over the next few years, Einstein's friends increasingly feared for his safety.

Although Einstein would become a vocal opponent of rising prejudice in Germany, he took the professional criticism of his work in stride. He knew his theories were not perfect, yet with each new paper published, more people came to recognize that Einstein's work was critically important. In 1922, Einstein was awarded the **prestigious** Nobel Prize in physics.

Scientists were astounded by what he wrote. Where had these unique ideas come from? But some were also angered, as they found their life's work suddenly diminished. In a mere six months, Einstein challenged over two hundred years of accepted scientific thought about the content and behavior of the known universe. The scientific community was equally amazed that these ideas came not from a professor of **physics** at a major university, but from a curious, 26-year-old patent clerk.

Immediately after the publication of his ideas, Einstein's scientific career took off in many directions. He was further energized by the attention his work received from the scientific community and by the opportunities that were open to him. He received invitations to speak at scientific meetings and to explain his new ideas. The 1905 Nobel Prize winner in physics personally congratulated Einstein. A well-known and highly respected professor of physics named Max Planck even began to teach Einstein's ideas to his students. In time, 1905 came to be known as Einstein's "miracle year."



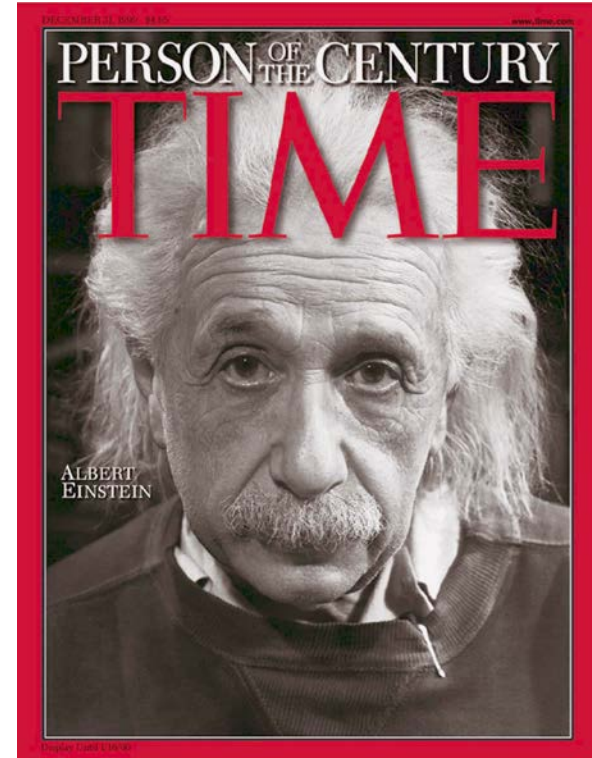
"The most incomprehensible thing about the world is that it is comprehensible."

A Rising Star

Einstein continued to work at the patent office until 1909. That year, he was gratified to finally receive an offer for a full-time job at a university. Einstein accepted the position but then characteristically jumped from school to school for the next few years, still searching for the ideal place to pursue his research.

Meanwhile, he continued to develop and refine his earlier ideas, which was hard work, and several times Einstein thought that he was on the wrong track. He could be highly self-critical. In fact, his ideas were so new and unfamiliar that he often thought he was losing his mind. Then, in 1915, he had a breakthrough—he finally determined how to unite his earlier individual ideas into one system, which he called the general theory of relativity.

Einstein's ideas once again excited scientists around the world. In 1919, British scientists tested Einstein's theory by measuring the position of a star during a solar eclipse. If Einstein was correct, the star would appear to be in one position while it was actually in another. To the astonishment of many, the star appeared almost exactly where Einstein said it would be!



Einstein was named "Person of the Century" by *Time Magazine*.

Newspaper headlines around the world announced the findings. A British newspaper declared, "**Revolution** in Science—New Theory of the Universe." A German newspaper called Einstein a "new celebrity in world history" and said that his ideas were "a complete revolution in our concepts of nature." Overnight, Albert Einstein became one of the most famous people in the world. Some would eventually proclaim that he was the most **influential** person of the twentieth century.