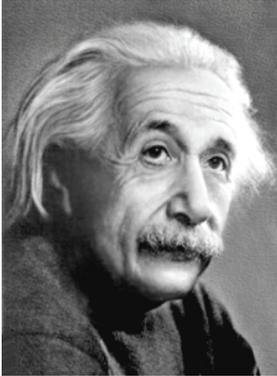


# Albert Einstein

*Albert Einstein revolutionized the way we view the physical world on an atomic scale.*

## Looking for “something deeply hidden”



Albert Einstein was born in 1879 in Ulm, Germany, and his family moved several weeks later to Munich. He was a quiet child who spent hours building houses of cards and playing the violin. One story he told from his youth was of his first encounter with a magnetic compass: The needle seemed to him to be guided northward

by an invisible force. He was convinced there had to be “something behind things, something deeply hidden.” The search for that “something” occupied him until his death in 1955.

Einstein was not fond of school until he entered secondary school in Aarau, Switzerland (his family had moved to Italy). There he found first-rate laboratory facilities and teachers who nurtured his interest in science. He went on to attend the Swiss Federal Institute of Technology in Zurich and graduated in 1900 with a teaching degree. His first permanent job was as a technician in the Patent Office in Bern. Einstein enjoyed evaluating patent claims, but the best part of the position was the stability it provided. He spent his evenings reading and thinking about current issues in theoretical physics.

## Stepping into the spotlight

In 1905, Einstein published three papers that radically changed the way scientists understood the physical world. Most work in theoretical physics is accomplished through discussions among scientists. But, Einstein wrote his paper without such discussions in relative isolation.

- The first described light as discrete bundles of **radiation**. Einstein’s description formed the basis for much of **quantum mechanics**.
- The second paper proposed his **theory of special relativity**. While Einstein was not the first scientist to generate all of the pieces of this theory, he was the first to unify them.

- The third paper showed that Brownian motion (the erratic motion of microscopic particles in a fluid) provided physical evidence for the existence of atoms and molecules. Until Einstein’s paper, scientists had only theoretical evidence of these tiny particles.

Einstein earned respect as one of Europe’s leading scientific thinkers as a result of these papers. In 1909 he became a professor first in Zurich, then Prague, and eventually returned to Zurich. In 1914 he was appointed director of the Kaiser Wilhelm Physical Institute and professor at the University of Berlin.

## Light bends in space

Einstein’s interests turned toward a **theory of general relativity**, which showed how **inertia** and **gravity** are connected. His theory predicted that light from distant stars should be bent by the curvature of space near the sun. During a solar eclipse in 1919, his prediction was proven correct. In 1921, he was awarded the Nobel Prize in physics for his work on the **photoelectric effect**.

## War and peace

During World War I, Einstein, a pacifist, refused to support Germany’s war aims. In 1933, he left Germany to become a professor at Princeton University. In 1939, concerned about the rise of fascism, he decided force was necessary to face this threat. He sent a letter to President Franklin Roosevelt that urged the United States to develop an atomic bomb before Germany did. After the war, Einstein was a strong supporter of nuclear disarmament.

## Unifying the forces of nature

Einstein’s scientific interests in his later years focused on finding a unified field theory, which he hoped could integrate all the known forces in nature in a single equation that would show they were all manifestations of a single fundamental force. While he never managed to find what he was looking for, his work fascinates theoretical physicists to this day.

## Reading reflection

1. Look up the definition of each boldface word in the article. Write down the definitions and be sure to credit your source.
2. Imagine that you knew Albert Einstein when he was growing up. Write a brief description of him as a young person.
3. How did each of Einstein's first three papers contribute to scientific understanding?
4. **Research** Brownian motion and prepare a demonstration for your classmates.
5. What event helped prove Einstein's prediction that light bends near the sun?
6. **Research** how scientists tested Einstein's theory of general relativity in 1919. Write a paragraph to explain their method.
7. The United States' involvement in World War II lasted from 1941-45. What important thing did Einstein do before the war?
8. After World War II, why do you think Einstein argued for nuclear disarmament?
9. Define the term "unified field theory" in your own words.
10. Which of Einstein's theories was most important? Why? Compare your answer to this question with others in your classroom or discussion group.