

Odd Boy Out: Young Albert Einstein

Book by Don Brown

Literature based unit study prepared by Kristy Seaman and Beth Keesler

Library List

Genius: A Photobiography of Albert Einstein by Marfe Ferguson Delano

Ask Albert Einstein by Lynne Barasch

Rescuing Einstein's Compass by Shulamith Levey Oppenheim

Albert Einstein, Young Thinker by Marie Hammontree

Who Was Albert Einstein? by Jess Brallier

Albert Einstein (DK Biography) by Frieda Wishinsky

Social Studies

Geography- Germany, Italy, Switzerland

Locate these places on a world map: Ulm, Germany—Milan, Italy—Zurich, Switzerland. You may want to place a story disk on each location and attach with a string as you discuss each time Albert Einstein moved.

German Culture

Germany is rich with history and culture. Here are some aspects of German culture to discuss with your student.

Food

Combinations of spice meats, often red meat, and salted fish with vegetables and wine or beer are classic German cuisine. German bratwurst, or wurst, is a local specialty. There are over 200 varieties of the sausage. Try to find some German food to share with your student as your study Einstein.

Clothing

Germans dress in modern style; however, there are native costumes worn during festive occasions. The Bavarian *Tracht*, traditional Munich-style dress, includes a green wool cape and jacket. Men might wear grey or green trousers with a green felt hat topped by a pair of feathers.

Music

Many great musicians including Wolfgang Mozart, Franz Haydn, Johann Sebastian Bach, Ludwig van Beethoven and Richard Strauss lived and worked on Germany. Thus, music is a passionate aspect of German culture. Even today, music education is strongly supported with concerts or choral groups being a big part of social activities.

Festivals

The Munich Oktoberfest has been held every year since 1810. It began as a horse race celebrating the marriage of Prince Ludwig I and Princess Therese von SachsenHildburghausen of Saxony. Today, the festival lasts 16 days and includes large beer tents, side shows, fun fair, musical performances, food and craft stalls.

Language

We use many German words in our everyday English. A few are: hamburger, kindergarten, bratwurst, dachshund, delicatessen, diesel, dollar, Fahrenheit, flack, fest, school, and spritz.

German History, WWII

The events that led up to World War II are complex and may be difficult for younger children to grasp. You may choose to briefly review or go into more depth as you deem fit. Germany was the main aggressor in the first world war, 1914-1918, and was punished severely by the United States, France and England.

The Treaty of Versailles in 1919 caused that Germany pay heavy fines and Germany was prohibited from manufacturing heavy weapons. Germany's state of affairs spiraled downward afterwards. Its currency lost its value, people were not able to afford their homes or food and were hungry and sick, political parties were severely divided.

In the midst of this chaos, a new political party, the Nazi Party, was formed opposing the current government rule. The Nazi Party was led by Adolf Hitler. The Nazi Party was not the party of government; however, Hitler staged attempts to overthrow the current govt. leaders which led him to a short prison stay, where he wrote *Mein Kampf* a book of his ideas about German superiority. The Nazi Party slowly grew throughout the 1920's and by 1933 Hitler became Chancellor.

German people were distraught with high unemployment rates and high cost of living and were eager for new leadership, someone who could change their current situation.

Within months, Hitler's popularity grew and in 1934 the president died. The German military swore their loyalty to Hitler and the Nazis took complete control of the government. He declared the Nazi Party as the only legal party in Germany. Hitler began to rearm Germany: Service in the German army was mandatory for all men; children were encouraged to join youth loyalty groups; factories were devoted to manufacturing airplanes, weapons, and warships.

Hitler was a fascist, a person who believes in absolute power for the person in charge. He became greedy and wanted to take over Europe. Hitler invaded Austria in March of 1938, Czechoslovakia in 1939, and Poland in September of 1939 despite communications from the USA for peace. Because of Germany's invasions, Britain and France declared war on Germany.

Albert Einstein Timeline

1879

There is much mystery and inaccuracy regarding Albert Einstein's childhood. He was an inquisitive, bright child. Contrary to belief, Albert did very well in school; however, he did not like school. The German schooling system at that time were very strict and required rote memorization. If a child did not do well, he would be subject to harsh discipline. As a result of this system, Albert was disinterested in school. He had a great interest in math and physics that continued into adulthood and eventually made him the world's most famous scientist.

1895

At the age of fifteen Albert quit high school (disgusted by rote learning and martinet teachers), and followed his family to Italy where they had moved their failing business. After half a year of wandering and loafing, he attended a congenial Swiss school. The next year he entered the Federal Institute of Technology in Zurich.

1900

After graduating from Zurich, he worked as a technical assistant at the Swiss Patent office. This is where he found much time to mull over ideas.

1905

Einstein published five groundbreaking papers, of which four are written all in a few months. The first paper claimed that light must sometimes behave like a stream of particles with discrete energies, "quanta." The second paper offered an experimental test for the theory of heat and proof of the existence of atoms. The third paper addressed a central puzzle for physicists of the day – the connection between electromagnetic theory and ordinary motion – and solved it using the "principle of relativity." The fourth showed that mass and energy are two parts of the same thing, mass-energy ($E=mc^2$).

1909

Einstein became an assistant professor at the University of Zurich, his first full-time physics job. The next year he returned to the Federal Institute of Technology in Zurich as Professor.

1914

WWI begins, Einstein rejected Germany's aggressive war aims, supporting the formation of a pacifist group.

1915

After a decade of thought, with entire years spent in blind alleys, Einstein completed his general theory of relativity. Overturning ancient notions of space and time, he reached a new understanding of gravity. Meanwhile he continued to sign petitions for peace.

1919

May 29, a solar eclipse proves his Theory of Relativity

1921

Aided by his fame, Einstein championed the fledgling German republican government and other liberal causes. Partly as a result of this, he and his theory of relativity came under vicious attack from anti-Semites. He began travelling, attended an International Trade Union Congress in Amsterdam, and visited the United States to help raise funds for the Hebrew University in Jerusalem. The following year he received the Nobel Prize.

1933

Unwilling to live in Germany under the new Nazi government, Einstein joined the Institute for Advanced Study in Princeton, New Jersey. He turned away from strict

pacifism, and warned world political leaders to prepare for German aggression. He also worked to rescue Jewish and other political victims of the Nazis.

1939

Einstein signed a letter that informed President F. D. Roosevelt of the possibility of nuclear bombs, warning that the Germans might try to build them. The next year Einstein became an American citizen.

1952

Einstein was asked to become the second President of the State of Israel, but declined. He was supporting many causes, such as the United Nations and world government, nuclear disarmament, and civil liberties.

1955

April 18 he becomes ill and dies.

Safety

According to the author, Albert's parents allow him to walk the streets of Munich alone at 4 years old. Ask your student if they feel this is unusual. Discuss with them that Albert's mother secretly followed behind him to make sure that he was able to handle himself. His parents encouraged independence at a young age (*Genius: A Photobiography of Albert Einstein*). Discuss why it is not safe to walk alone, and suggest ways to practice safety. A fun go along book about safety is *Officer Buckle and Gloria*.

Wolfgang Amadeus Mozart

Einstein's mother, Pauline, was a talented pianist. She introduced Albert to music as a small child, beginning his violin lessons at age six. He labored under unimaginative instruction until discovering the joys of Mozart's sonatas at age 13. From that point on, although he had no further lessons, his violin remained a constant companion. Einstein said later that, "I live my daydreams in music. I see my life in the form of music."

Born on January 27, 1756 in Salzburg, Austria, Mozart was a child prodigy affluent in violin and piano. Three days before his 5th birthday, Mozart mastered his first musical composition. He spent most of his childhood in musical instruction by his father and traveling for concerts. He married and had 6 children, 2 surviving. At the time of his death he composed more than 600 pieces in many different musical styles. He was a versatile composer and wrote in almost every major genre,

including symphony, opera, solo concerto, chamber music and the piano sonata. While none of these genres were new, the piano concerto was almost single-handedly developed and popularized by Mozart. He also wrote a great deal of religious music; and he composed many dances and other forms of light entertainment.

Take some time and listen to Mozart with your student. You may enjoy *Mozart's Magnificent Voyage* by Classical Kids.

Nobel Prize

Established in 1901 by Alfred Nobel of Sweden, the Nobel prize is one of the highest universal recognitions an individual can get. It is awarded to most often one person a year who has conferred the greatest benefit to mankind in one of five areas: peace, literature, chemistry, medicine and physics. Since 1902 the King of Sweden has awarded all recipients the prize. Each "Nobel Prize Award" consists of a gold medal, a diploma, and a monetary grant, today the amount is 1.5 million dollars. Albert Einstein was awarded the 1921 Nobel Prize for Physics for his work in the photoelectric effect. This award is given to one individual who made the most important discovery or invention within the field of physics.

Science

Compass

When Albert was ill as a child his father gave him a compass to occupy his time. The compass is an instrument used to navigate, or determine direction in relation to the north and south magnetic poles of the Earth. A compass usually consists of a magnetized pointer, such as a bar or needle floating in a fluid or freely upon a pivot, that aligns with Earth's magnetic field (usually marked North). The face of the compass includes the cardinal points of north, south, east and west. An early form of the compass (a magnetized needle floating in water) was invented in ancient China sometime before 1044. There is evidence of the discovery of a magnetized, navigational-like instrument in the Olmec civilization (inventors of chocolate), pre-1000b.c. which predates the Chinese invention. The dry compass was invented in medieval Europe around 1300. This was supplanted in the early 20th century by the liquid-filled magnetic compass. Prior to the compass, seamen determined their position and direction at sea primarily by the sighting of

landmarks and the position of celestial bodies, thus, they often stayed close to land and did not venture far. The invention of the compass enabled the determination of heading when the sky was overcast or foggy. And, when the sun or other known celestial bodies could be observed, it enabled the calculation of latitude. This enabled the mariners to navigate safely away from land, exploring and discovering other lands, people and cultures, an “Age of Discovery”.

Make your own compass with a cork, magnetized needle and bowl of water.

1. Magnetize a sewing needle by rubbing the needle along a magnet in one direction making sure to cover the entire surface. If the needle sticks to your fridge your good to go.
2. Mark the needle with a marker at one end.
3. Fill a small bowl partway with water (enough so a piece of cork will float freely). Place a thin circle of cork in the bowl.
4. Gently place the needle on the cork. The marked end of the needle should point in a northerly direction.
5. Pick up the needle and place it in a different direction. Where does it end up each time? Try turning the bowl to see what happens.

As long as a magnet can pivot easily, it will always turn to point the same way: the north pole of the magnet points north and the south pole points south. If your student is interested this would be a fun time to investigate and learn more about magnets. Try *Science with Magnets* an Usborne Science book for fun activities.

A good go-along book is *Rescuing Einstein’s Compass*

Photo electricity

Einstein believed that light is made of tiny particles called photons. Einstein explained that when the photons in a light beam hit a piece of metal the electrons are knocked out of it. Electrons are tiny electrically charged particles found in every living and nonliving thing. Try this simple experiment: use a remote control to turn a television or stereo on. Explain that because of Einstein’s theory we are to use a beam of light to turn on an electrical device. Now stand between the television and remote. What happens? Your body blocks the beam of light and so the electrical particles in the TV are not disturbed—nothing happens. His work with photo electricity opened the door for future inventions of televisions, cell phones, and remote controls.

Speed of Light/ Theory of relativity

As a child, Einstein wondered *what would it be like to ride a light beam?* As an adult he was able to answer this question. He wondered if light traveled at the same speed no matter where a person was. The speed of light is approximately 186,000 miles per second. Imagine standing on the side of a railroad track and a fast moving train passes you by. Because you are standing still, the train appears to be going faster to you than for those who are actually on the train. Now imagine you are watching someone standing on the train throwing a baseball. Which person would see the ball moving faster? The person on the train would see the ball moving at a speed relative to standing on a fast moving train; however, you would see the ball moving at a much quicker rate because you are also seeing the fast moving train.

Try this sometime while you are in a car-- watch another moving car beside yours. If you wait, it may actually seem like you are not moving. Einstein called this the Theory of Relativity. Time and distance appear one way to you and another to the person moving at a different speed. He declared that the faster an object moves, the slower time passes. Today Einstein's theory has been confirmed. Scientists put a very accurate atomic clock in a high speed jet that traveled around the world and compared the clock to the same identical one placed on Earth. The clock that was on the jet actually ticked slower. Discuss with your student the possibility of time travel. Is it possible? Is it practical?

Applied Math

Geometry

Albert Einstein loved math. When he was 10, a poor student named Max Talmud began dining with the Einstein family once a week. Max would bring illustrated books for Albert to study, and they would discuss what Albert learned. Max gave him a geometry textbook two years before Albert was to study the subject at school. Max later recalled, "Soon the flight of his mathematical genius was so high that I could no longer follow."

Geometry is the study of shapes, lines, points, angles. This is a perfect time to introduce some basic geometry to your student. Have your student identify all of the shapes in the equation figure. Make a shape book including two and three dimensional shapes depending upon ability. Your older student may even want to tackle some equations (perimeter or area).

When Albert was younger he would play the geometry game with his family. Play the geometry game together (find a square in the room, find a triangle outside, etc.).

Roman Numerals

Ancient Romans used letters rather than numbers when numbering things. Roman numerals can still be found on watches or clocks, old buildings. Have your student identify the numerals in the book.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2	3	4	5	6	7	8	9	10	11	12

I	V	X	L	C	D	M
1	2	10	50	100	500	1000

Basic Rules:

-If a larger numeral follows a smaller one, subtract the first from the second: IV = V - 1 (5-1)

-If a numeral is followed by one or more symbols that are equal to or less than it, add them together: XII = X + I + I (10 + 1 + 1)

-If a numeral is a large number, such as the year, each digit is represented individually: 1933 = M + IX + III + III = M IX III III

Have your student convert to Roman Numerals

-age -zip code

-height -weight

-address -year born

-phone number

Language Arts

Vocabulary

Vocabulary word	Definition
<i>fret</i>	An irritated or worried state
<i>brooding</i>	To think anxiously or gloomily about something
<i>astonishes</i>	To strike with sudden and usually great wonder
<i>taunt</i>	To reproach or challenge in a mocking manner
<i>solitude</i>	The state of being alone
<i>irk</i>	To make weary, bored
<i>mulls</i>	Ponder, consider carefully
<i>phenomenal</i>	An extraordinary person or thing
<i>knotty</i>	A problem

Contrast

Writing can be developed with one or more methods of arrangement. Contrast uses details to show how one subject is different from a more familiar subject is.

The others love to play ball. Albert does not like sports.

Soldiers on parade excite the boys. They disturb Albert.

In both examples, the writer contrasts Albert with the “other boys” to show his differences.

Writing Clear Directions

Working at the patent office influenced Einstein’s thinking process. Through this job he learns to read and draw technical drawings. Patents must have a description page telling what the item does, and how it works. Through reading and analyzing these, Einstein learned how to write clear, simple explanations. You may want to have your student write or dictate some simple clear directions about a favorite or familiar activity.

Copywork

Albert Einstein was quoted "In the past it never occurred to me that every casual remark of mine would be snatched up and recorded. Otherwise I would have crept into my shell." Discuss some of his famous remarks and what your student thinks they mean. You may also choose to use these for copywork.

~Life is like riding a bicycle. To keep your balance, you must keep moving.

~The only reason for time is so that everything doesn't happen at once.

~Joy in looking and comprehending is nature's most beautiful gift.

~Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world.

~The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed.

Art

Building Architecture

Notice the lines of the buildings in the first few pages. German architecture is varied and includes Gothic styles as well as baroque designs. Gothic architecture features include the pointed arch, the ribbed vault and the flying buttress. Important features of Baroque architecture include broader, occasionally circular forms, dramatic use of light, either strong light-and-shade contrasts or uniform lighting by means of several windows, opulent use of ornaments, and large-scale ceiling frescoes (paintings on plaster).

Mixed Medium

The illustrator used digital images with pen, ink and watercolor. The artist blends digital images with ink and watercolor in a two-page layout representing Albert Einstein's thoughts and ideas which gives this layout a very unique feel. The other pages are ink and watercolor.

Shadowing

Shadowing brings depth to an illustration. It may depict where the source of light is, give a picture a three-dimensional look or evoke a sense of mystery or emotion

Drawing Faces

Don Brown uses simple lines to create cartoon-like illustrations. Try to make simple faces using watercolor oval shapes and add details to face with black ink. Experiment with different ways of drawing features.

Bible/Character

Courage

Discuss 2 Timothy 1:7. Albert's schoolmates had a desire to join the military and enjoyed playing sports. Albert remained true to himself and demonstrated much courage when he told a soldier that he did not want to join the military. At that time, Albert could have been arrested as it was expected of all German boys to join.

Perseverance

Read Philippians 4:13. Einstein demonstrated many examples of perseverance throughout his life (school, building with cards, working out theories, urging US into war w/Germany).

Just for Fun

Build a house of cards. Albert was able to build one 14 stories high. How high can you go?

Watch *The Sound of Music*, a classic movie about a family who escapes Austria during World War II.

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