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Leonardo da Vinci
Content Consultant
Elizabeth Feery
Independent Art Consultant
Children’s Educational Art Program
# Table of Contents

Chapter 1  A Gallant Spectacle  6  
Chapter 2  Growing Up in Vinci  14  
Chapter 3  An Artist’s Training  24  
Chapter 4  The Artist on His Own  32  
Chapter 5  Milan  40  
Chapter 6  The Notebooks  50  
Chapter 7  The Unsettled Years  60  
Chapter 8  Villas and Veins  70  
Chapter 9  Leonardo in France  80  
Chapter 10  Leonardo’s Legacy  88  
Timeline  96  
Essential Facts  100  
Additional Resources  102  
Glossary  104  
Source Notes  106  
Index  110  
About the Author  112
Late on the night of January 13, 1490, candlelight spilled from the castle of Ludovico Sforza, duke of Milan. Inside, the walls were draped in colored silk and decorated with fresh pine branches. At one end of a great room, eight musicians...
sat on a carpeted stage. Music from their pipes, trombones, and tambourines filled the air.

The party had started at eight o’clock. For almost four hours, Ludovico’s guests had been eating, drinking, and dancing. They were celebrating the marriage of the duke’s nephew, Gian Galeazzo Sforza. The groom was only 20 years old. He was a pale and serious young man. His new wife, Isabella of Aragon, was a year younger. She was known for her sweet manner and beauty.

Throughout the night, guests made speeches and recited poems in many different languages. Each speech and poem was presented as a gift to Isabella. However, the highlight of the evening was still to come. Ludovico had planned a masque, a type of musical play popular at the time. The words and music had been written by the court poet especially to honor the new duchess. The poet titled his work *Il Paradiso*, or “Paradise.”

At last it was midnight. The guests gathered and faced a curtain at the far end of the room. Candles were blown out to dim the bright lights, and the heavy curtain opened. Everyone gasped in surprise.

—I am never weary of being useful.”

—Leonardo da Vinci
The revolving stage on which the masque would be performed was an amazing creation. It was made of wood and cloth in the shape of half of a huge egg. The inside of the egg was covered with a thin layer of gold that reflected the light of dozens of overhead torches. Their flickering light represented the stars in the night sky.

The torches also lit seven openings, or niches. Inside each niche, a man was dressed in costume to portray the sun, moon, or one of the five planets—Mercury, Venus, Mars, Jupiter, and Saturn. In these niches, the “planets” appeared to revolve freely in space. Near the top of the egg, more torches gleamed behind sheets of

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**Learning About Leonardo**

Leonardo lived more than 500 years ago. As a result, there is not a lot of information about his life. Much of what is known comes from public records, Leonardo’s notebooks, and the writing of others. For example, one guest wrote about his experience at the masque and described the decorations, the music, the dancing, and the stage set:

*Il Paradiso was made in the shape of a half egg, which on the inner part was all covered with gold, with a very great number of lights, as many as stars, and with certain niches where stood all the seven planets according to their degree, high and low. Around the top edge of this hemisphere were the twelve signs, with certain lights behind glass, which made a gallant and beautiful spectacle. In this Paradiso were heard many songs and many sweet and graceful sounds.*
colored glass. Scenes painted on the glass depicted the signs of the zodiac—the 12 constellations thought to be important. Even in the glittering court of Ludovico Sforza, this stage setting was an amazing and fantastic sight.

The crowd fell silent when a young boy dressed as an angel stepped out to announce the beginning of the masque. The performances, in honor of Isabella, included music, ballet, poetry, and speeches.

The fantastic stage set for the performance of *Il Paradiso* was designed by one of the most famous artists of all time, Leonardo da Vinci. It may seem odd that an artist would design stage sets. It may seem even more odd when you consider Leonardo’s reasons for joining Ludovico’s court. Leonardo had arrived about eight years earlier. Some sources indicate he was hired as a musician; others indicate that he went to Milan to serve as a military engineer. Either job was very different from that of an artist.

**The Missing Planets**

Leonardo’s stage set showed only the sun, moon, and five planets. (The telescope did not exist for another century, so Uranus and Neptune had not been discovered yet.) Earth was missing because it was not considered a planet. Instead, it was thought to be the center of the universe, around which the other celestial bodies revolved.
Who exactly was Leonardo da Vinci? A stage designer? An artist? A musician? An engineer? He was all of these—and much, much more. Leonardo da Vinci is remembered as an amazing genius in many fields. He was an artist whose paintings are considered priceless. He was a musician who was praised for his singing and playing abilities. He was an inventor whose ideas were far ahead of his time. He was an architect who dreamed of a city that was clean and beautiful,
Leonardo da Vinci

unlike the cities of the day. He was a scientist who studied the human body, plants, animals, flight, water, the stars, and other subjects. He was a writer and an illustrator. He filled thousands of pages with notes and sketches that reflected his ideas. There was almost no field that Leonardo did not master.

Leonardo did all of this despite some limitations. He never attended a university or earned a degree. He was not fluent in Latin, the language of educated people of the time, but he understood the basics. And, he was left-handed—something considered unacceptable in the fifteenth century.

How did Leonardo manage to do all that he did? Much of the answer, of course, lies in the man. Without a doubt, Leonardo was a talented artist. Also, he was highly intelligent and curious about the world in which he lived. This combination of talents allowed him to succeed in many areas.

However, part of the answer is due to the time in which Leonardo lived. The fifteenth century was a

Leonardo’s Dragon

Planning festivities and designing costumes and sets let Leonardo use his imagination to create strange creatures. Just a year after Il Paradiso, Leonardo was involved in planning parts of a joust. One of the jousters wore a helmet designed by the artist. A dragon-like creature sat on the top of the golden helmet. The dragon’s long tail stretched down the back of the jouster and his horse.
period of great change in Europe. It was the beginning of the Renaissance—an era named for the French word meaning rebirth. A love of learning was being reborn. New ideas in art, music, literature, and science were brought forth.

Where Leonardo was born is important. He lived much of his life in Italy, which was the center of the Renaissance movement.

Leonardo’s greatness was due to a combination of factors. To truly understand him and his work, it is important to understand three things—the man, the time, and the place.

Leonardo’s story begins in a small farm town.——

Italy’s City-States
In Leonardo’s time, Italy was not a single nation. It was made up of large, independent, self-governing city-states such as Milan, Florence, and Venice. Each city-state was independent and controlled by a different rich and powerful family. Florence was the center of banking and finance. Venice gained its power from its shipping and trade routes. At times, these city-states went to war, hoping to gain control of larger areas of land.
eaport in Venice during the Renaissance
Leonardo was born in the small town of Vinci on April 15, 1452. As was the custom of the time, people took their family name from the name of the town in which they were born. Thus, the name Leonardo da Vinci.
In 1452, Vinci was a sleepy country town with a church and a few stone houses. Many of the houses huddled close to the walls of a castle. Vinci was surrounded by fields of wheat and other grains, vineyards, and lush groves of olive trees. Mount Albano, a high hill with thickly forested slopes, stood watch over the town. The nearest city, Florence, was a full day’s ride away—approximately 20 miles (32 km).

Little is known about Leonardo’s childhood. However, historians do know his birth date because Leonardo’s grandfather, Antonio da Vinci, recorded the event. In a notebook started by his own grandfather, Antonio noted Leonardo’s birth—his first entry in 16 years. He barely had room at the bottom of the last page to write:

1452—There was born to me a grandson, the son of Ser Piero my son, on the 15th day of April … He bears the name Lionardo.2

The note also mentioned that the baby was baptized the following day by the parish priest.

“Nature has beneficently provided that throughout the world you may find something to imitate.”

—Leonardo da Vinci
Leonardo’s mother, Caterina, was either a servant girl or the daughter of a poor peasant family. In either case, she would not have been considered a suitable wife for Antonio’s son. Ser Piero da Vinci came from a respected and educated family. While not rich, Leonardo’s family was well off and owned land. A marriage between Ser Piero and Caterina was not allowed.

Before Leonardo was a year old, his father married a woman named Albiera. Caterina married a man who lived in a small town near Vinci. It is uncertain if Leonardo ever lived with his father and stepmother. For at least the first few years of his life, he most likely lived with Caterina and her husband. By the time he was five years old, however, it seems that Leonardo was living with his grandfather in Vinci. Tax records for 1457 list the boy as one of Antonio’s dependents.

Ser Piero and Albiera lived a day away in Florence. The title “Ser” indicates that Piero was a notary. He belonged to an organization, or guild, of notaries. This guild was one of the most respected in Florence.

**Books in Print**
When Leonardo was four years old, an exciting event occurred in Germany. The first book—a Bible—was produced on a printing press. This meant that books became more available to ordinary people. As an educated family, Leonardo’s family might have owned one or two books.
In the 1400s, notaries were a combination of a lawyer and an accountant. They drew up contracts, kept records, and helped to set up business deals for others. Because there was not much need for notaries in small villages such as Vinci, Ser Piero made his home in the city of Florence. He only visited Vinci when time allowed.

Leonardo came from a long line of notaries. For more than 100 years, the men of the family had held this position. Leonardo’s grandfather, Antonio, was the exception. There is no evidence that he ever studied or worked as a notary or that Antonio ever lived in Florence. He was happiest in Vinci caring for the family orchards, olive trees, and vineyards.

Leonardo grew up in the country under the care of his grandfather. But Antonio was not the only important influence on young Leonardo not only wrote and drew with his left hand, but he wrote his words backwards, from right to left. His letters were also backward. The letter b looked like a d. This style of writing is called mirror writing because it can be read by holding the page up to a mirror and reading the reflection.

Leonardo may have developed mirror writing as a kind of code. He was concerned about keeping many of his ideas secret. It is more likely that his writing style was a result of being left-handed. It may even have been a method he adopted to keep from smudging the ink or chalk as he wrote and sketched. This would have been a problem for a left-handed writer and artist.
Leonardo’s life. Leonardo also was close to his father’s youngest brother, Francesco. A teenager when Leonardo was born, Francesco had no interest in becoming a notary. He loved the country and life on the farm.

Leonardo and Francesco spent much time together. Francesco may have taught his nephew how to care for the olives, grapes, and grain grown on the farm. Leonardo certainly learned how to plant, plow, and harvest the fields. He also would have helped make wine from the grapes and oil from the olives.

Leonardo’s first-hand knowledge of the oil-making process is found in a

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**The Renaissance**

The term Renaissance comes from a French word that means rebirth. It is also used to describe Europe from approximately 1300 to 1600. What was Europe like before the Renaissance?

For almost 1,000 years, from the late fifth century to the fourteenth century, control of the land and power in Europe constantly changed. People were poor and uneducated; lives were often short and violent. The powerful Catholic Church controlled most aspects of daily life.

By the fourteenth century, kings replaced warlords and united the regions. People began to produce and trade goods. Europe became more financially stable. Cities grew into important places of business. This was especially true of the city of Florence.

Along with these changes in lifestyle, there were changes in thinking. Not only was there an interest in studying the ancient cultures of Greece and Rome, but there also was an interest in creating art and literature. This was greatly evident in Italy. The genius of the artist Botticelli and the writer Dante preceded Leonardo. Today, Leonardo the artist, inventor, and scientist sums up what has come to be known as the “Renaissance man”—a person who is talented in many ways.
sketch he made of the olive mill years after leaving Vinci. He also drew another machine and made a note that it was for grinding colors. In Leonardo’s time, artists made their own oil paints similar to the way olive oil was made. The knowledge of this process would have helped him as an artist.

Leonardo’s childhood in the country affected him in many ways. He left Vinci at a young age and lived most of his life in cities. Still, much of Leonardo’s work shows his love of nature and the country. He often sketched landscapes, rivers, and trees. He drew all kinds of animals and was especially fond of drawing horses. This was a reflection of his love and respect for all living things.

It appears that Leonardo had a comfortable life growing up in Vinci. However, the circumstances of his birth presented problems regarding his education. Children did not go to school as we know it today. Children from wealthy families such as Leonardo’s were
usually educated at home. They were taught to read and write in Latin. While Italian was the language of the people, Latin was the language of scholars.

Leonardo learned to read and write in Italian, but was not fluent in Latin. As the child of unmarried parents, it was against the law for him to attend a university. However, he learned mathematics—perhaps from the village priest. He also showed a talent for music. He had a beautiful voice and had learned to play the lyre as a child.

After receiving a basic education at home, young men from good families attended university in Florence. They studied grammar, logic, rhetoric (speaking and writing), arithmetic, geometry, music, and astronomy. Without this kind of university education, Leonardo could never become a notary like his father, or a doctor, banker, or pharmacist.

Leonardo’s left-handedness is another reason why formal education would not have been considered

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An Early Work

The earliest dated work by Leonardo shows his love of the countryside near Vinci. In a small drawing, he depicts hills, trees, and a waterway with boats. There is also a waterfall, a castle on one hill, and a tower on another hill. On the drawing, Leonardo wrote a note and dated it August 1473. The drawing was made when Leonardo was 21, years after he had left Vinci.
overly important for him. Left-handedness was considered unacceptable, and children were forced to learn to use their right hand. Apparently, no one ever tried to correct Leonardo’s left-handedness.
If attending a university was not an option for Leonardo, what could he do? Become a farmer like his grandfather and Francesco? Or, could he follow another path and become an apprentice and study with a master in a workshop? Apprentices usually came from families who were not as educated or well off as Leonardo’s family. Perhaps Leonardo showed artistic talent even as a young boy. For him, being apprenticed to an artist was a logical choice.

Ser Piero found a position for his teenaged son in Florence. It was time for Leonardo to leave Vinci—and his childhood—behind.
Leonardo’s left-handed, backward handwriting
Chapter 3

An Artist’s Training

The city of Florence was a far different place than the quiet village of Vinci. Seven miles (11 km) of wall surrounded the city and protected it from its enemies. Eighty watchtowers rose from these walls. Within them, the city was in a stage of rapid...
growth, with new buildings and roads being constructed.

Arriving in Florence around 1466 would have been both exciting and overwhelming to young Leonardo. Florence was home to over 50,000 people and more than 100 churches, 33 banks, and 23 palazzi, or elaborate estates, owned by the very wealthy. There were also hundreds of shops. Artists and craftsmen worked with glass, wood, wool, silk, leather, and bronze.

Surely members of Leonardo’s immediate family had noticed his amazing artistic talent. That might explain why his father, Ser Piero, brought him to Florence to study in one of the most successful workshops in the city. The shop belonged to Andrea del Verrocchio. The master artist was known for his beautiful sculptures. He and his students created works in gold, silver, and bronze. They made paintings and portraits, suits of armor, and sculptures. They designed costumes and sets for theatrical productions, as well as tombstones and elaborate tombs. The students were Verrocchio’s apprentices. They worked and lived with their master to learn a trade. An apprentice’s family paid the master a fee to cover the cost of the boy’s room and meals.

“He is a poor disciple who does not excel his master.”
—Leonardo da Vinci
Most apprentices worked for their masters for about six years. They started by doing the most minor chores, and each year they took on more responsibility. Eventually, a hard-working apprentice could become a master. Then he would join another workshop or start his own and begin teaching new apprentices.

Leonardo and the other apprentices were kept busy 12 hours a day and worked every day except Sunday. They ran errands, swept the studio, and cleaned paintbrushes. They would also watch their master at work and listen as he explained his techniques.
Some of Leonardo’s chores would have related more closely to art. Art supplies were not available in shops; most were made in the studio. Apprentices learned how to make paintbrushes from animal hair. They learned how to mix ingredients such as oil, egg yolk, plant materials, and minerals to make paints. They learned how to heat the varnish and glue used in the shop.

Paper was expensive during the fifteenth century. Apprentices drew with a pointed metal pen on a piece of flat wood coated with ash. They practiced showing perspective (depth and distance) when drawing human figures or landscapes. They also spent time copying their master’s work.

After learning how to draw, an apprentice moved on to painting. In a studio such as Verrocchio’s, Leonardo would have learned two painting techniques. The first was to paint

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**Oil vs. Tempera**

Leonardo learned to paint with two types of paint. One was tempera paint, which was made by mixing powdered colors with egg yolk. The other was oil paint, which was used less frequently.

Leonardo preferred the rich colors that could be produced with oil paints. Unlike tempera paint, which dried quickly, oils stayed wet long enough to allow him to take his time painting. Leonardo experimented with different ways to make oil paints. He wrote about one method, “Make some oil of mustard seed; and if you wish to make it with greater ease mix the ground seeds with linseed oil and put it all under the press.”

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• 27 •
on a panel—a flat piece of wood. The second was to create a fresco or mural on a plastered wall.

The process for both techniques was similar. As a first step, Leonardo would brush white gesso on the panel so the paint would adhere better. Then, he would trace an outline onto the panel. The outline was most likely a drawing, or cartoon, done by Verrocchio as a pattern for a finished commission.

To trace the cartoon, Leonardo made tiny holes in the paper along the lines of the cartoon. Then the cartoon was placed on the panel and pounced with a powdered charcoal. The charcoal went through the holes and left an outline of dots. Later, the artist used the outline as a guide and added color to the work.

Once he had mastered these skills, Leonardo was ready to start painting. However, that did not mean he planned and completed a work of art on his own. During the Renaissance, artists’ studios were similar to factories. Many people worked together to create a finished product. A commission completed by Verrocchio’s workshop would not have been entirely his own work. One apprentice might have painted a cloud, another an angel or a tree. As an apprentice, Leonardo would have spent much of his time helping on his master’s paintings.
Painting was not the only skill Leonardo learned as Verrocchio’s apprentice. He also learned how to work with stone, clay, wood, and metal. In 1467, shortly after Leonardo arrived at the studio, Verrocchio finished an important commission for the ruling family of Florence. He made a tomb, or burial place, for Cosimo de’ Medici who had died three years earlier. Leonardo would have observed Verrocchio at work on this project as well as other pieces that are in museums today. The bronze statue David is over four feet (1.2 m) tall. Another sculpture is a grouping called Christ and St. Thomas. And it is believed that a pair of terra cotta angels, now in a Paris museum, was created in Verrocchio’s workshop with Leonardo playing a major role in their creation.

The terra cotta angels are not the only example that Leonardo was a star pupil. One of Verrocchio’s paintings, Tobias and the Angel, is evidence that the apprentice was better than the master. The work,
Leonardo on Learning to Paint

Years after leaving Verrocchio’s studio, Leonardo outlined the *Course of Instruction for an Artist*. It was much the same as what he had learned from his master. “The youth should first learn perspective, then the proportions of objects. Then he may copy from some good master. ... Then from nature. ... Then see ... the works of various masters. Then get the habit of putting his art into practice and work.”

Painted around 1469, shows an angel walking with Tobias, a young boy. Tobias is holding a fish, and a dog is running near the angel’s feet. The figures of the boy and the angel are definitely Verrocchio’s style. However, the artist was not known for his talent in painting landscapes or animals. Art experts are quite sure that Leonardo painted the fish and the dog. The scales of the fish appear to shimmer in the sunlight. The dog looks alive and its long, silky fur is beautifully painted. Also, a bit of landscape can be seen behind the dog. Perhaps the animal was added to the painting after it was almost done. More evidence of Leonardo’s work can be spotted in the curls over Tobias’s ears. They show signs that they were painted by a left-handed artist—most likely Leonardo.

By 1472, Leonardo had learned all he could from Verrocchio. He had spent six years as Verrocchio’s apprentice and was now 20 years old. This was much older than the average apprentice finishing his training. Was it finally time for Leonardo to strike out on his own?
Leonardo da Vinci

The image shows a statue of a young warrior, known as the "David," by Verrocchio. The statue is a bronze sculpture, depicting a nude male figure holding a sword, with a lion at its feet.
In approximately 1470–1471, Leonardo completed a painting—probably the first work he did entirely on his own. The painting, as did most works of the time, had a religious theme. *The Annunciation* showed the moment an angel appeared
to Mary. The painting was in a monastery near Florence for many years. Originally, art experts believed the painting was the work of another artist. However, experts now feel certain it is one of Leonardo’s earliest works. It was clearly done by a talented but inexperienced artist.

In 1472, at the age of 20, Leonardo became a member of the guild of painters in Florence. This guild was one of the most powerful in the city. Membership meant that Leonardo could open his own workshop and take on his own apprentices. However, Leonardo did not make this move. Instead, he stayed on in Verrocchio’s studio, working as the artist’s assistant.

It is not easy to learn exactly what Leonardo created, especially during his time as an assistant in Verrocchio’s studio. Renaissance artists did not sign their work. To identify a painting’s creator, art experts must look for clues. First, scientific methods are used to determine the approximate date when a work was created. Next, the artistic style of the piece is carefully studied. This includes the way paint is applied and the type of brush strokes used. Experts then match

“Many are they who have a taste and love for drawing, but no talent.”

—Leonardo da Vinci
that style to a work known to be by a certain painter. Other clues can be found in records such as contracts for commissions or payments for completed works.

Using these techniques, experts have identified some of Leonardo’s works centuries after they were created. One example is *Ginevra de’ Benci*, painted around 1475. The portrait is mentioned in writings about Leonardo from the sixteenth century. However, the painting had not been seen for years and was considered lost. Then, in the 1900s, experts discovered the painting in a private collection.

Some consider this painting to be Leonardo’s first real masterpiece because it is the earliest of his works to show his true talent. The portrait is of Ginevra de’ Benci, a 16-year-old noblewoman of Florence. It may have been painted as her wedding portrait. It is a small painting, but there are signs that it was originally larger and had been cut down. Ginevra’s face is ringed by lively curls and she is looking off to the distance. The background shows signs of Leonardo’s skill, with light gleaming on the water and trees in a haze.

Other details of the painting hint that the work has to be Leonardo’s. Ginevra is shown in front of a juniper tree. On the back of the panel, the artist drew a juniper branch surrounded by a wreath of leaves. Both
of these details play on Ginevra’s name, which is close to the Italian word for juniper tree—*ginepro*. Leonardo was known for his love of puns and often added such details to his work. The back of the panel also shows a scroll. It bears Latin words that mean “the form adorns virtue.” This was a common idea at the time—that outer beauty meant inner goodness.

Experts believe other works were done partly or entirely by Leonardo. He probably assisted Verrocchio with a commission for an altarpiece. A sketch thought to be by Leonardo shows one of the figures in the altarpiece. Several paintings of the Madonna—Mary, the mother of Christ—show Leonardo’s style in part or all of the work. A terra cotta angel in a small village church also is considered Leonardo’s work. The angel’s right arm is very similar to the arm of the angel in *The Annunciation* and the angel’s long, curly hair is typical of Leonardo’s style of painting.

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**Leonardo’s Looks**

According to accounts from the time, Leonardo was extremely handsome. Paolo Giovio, a contemporary of Leonardo, wrote, “He was by nature very courteous, cultivated and generous, and his face was extraordinarily beautiful.”

In his biography of artists, Giorgio Vasari describes Leonardo as a man of “outstanding beauty” and “infinite grace.” He also wrote that Leonardo was “striking and handsome, and his great presence brought comfort to the most troubled soul …”
In 1476, an event changed Leonardo’s family situation. Ser Piero’s first legitimate child was born, a boy named Antonio, to Ser Piero’s third wife. Leonardo’s first two stepmothers had died childless. Now, Ser Piero had a son who could attend university and become a notary. This may have helped Leonardo decide it was time to open his own workshop. After all, Antonio would be Ser Piero’s heir. Leonardo could not count on inheriting anything from his father. He would have to support himself.

Around 1477, Leonardo finally left the security of Verrocchio’s studio. He was 25.
years old and had spent ten years with Verrocchio as student, apprentice, and assistant. Now, he was on his own.

Leonardo struggled to survive. Florence was home to many artists. They competed with each other for commissions. Lorenzo de’ Medici was the greatest art patron in the city. Unfortunately, he did not commission any work by Leonardo.

On January 10, 1478, Leonardo received his first commission. He was selected to create an altarpiece for the Chapel of San Bernadino. Leonardo was not the first choice for the job. Another artist had already turned down the commission.

Leonardo received a down payment to do the work. He may have created sketches, or cartoons, for the altarpiece, but none of these sketches exist today. However, he never completed the job. Another artist did create the altarpiece years later. A section of the altarpiece shows an angel that is similar in style to Leonardo’s angels. Perhaps the artist who created the piece used part of a cartoon by Leonardo as a guide.

Friends in the Sciences
While living and working in his studio in Florence, Leonardo made a list of names. No one knows if the people he listed were friends or individuals he wanted to meet. Only five of the names can be read and only one is a painter. The rest are scientists. This shows Leonardo’s early interest in science.
This was not the last time Leonardo failed to complete a commission. In 1481, he was hired to create a painting for a monastery near Florence. He never completed this project.

What Leonardo did finish was greatly admired and his talent was recognized. Still, he had problems receiving commissions. Perhaps his habit of not completing his work explains why.

In 1481, the pope asked Lorenzo de’ Medici to select the best artist in Florence to decorate the walls of the Sistine Chapel. Lorenzo chose four artists for this commission—Leonardo was not selected.

It was time for a change. Leonardo closed his workshop and left Florence for Milan, about 190 miles (306 km) to the north. A new chapter in his life was beginning.

A New Style of Painting
Artists of the Renaissance were the first to paint portraits in which they tried to show people as they truly appeared. When creating a portrait, most artists drew the person as seen from the side. A few painters drew the person from the front. Leonardo was the first artist to draw his subject in a three-quarter pose, with the body turned slightly. This made the person appear more lifelike—as if he or she was looking at something or someone beyond the artist.
inevra e Benci has been identified as the work of Leonardo.
It was not his talent as an artist that Leonardo saw as his ticket to Milan. It was his ability to invent weapons and war machines. Leonardo offered his services as an inventor to Ludovico Sforza, the ruler of Milan. He began by
writing a letter in which he described the "secrets" he possessed.

After greeting Ludovico in his letter as “Most Illustrious Lord,” Leonardo described war machines such as "extremely light and strong bridges, adapted to be most easily carried…”¹ He also said he had "methods for destroying every rock or other fortress.”² And he stated that he had weapons that could "fling small stones almost resembling a storm” and "covered chariots”³ that would keep soldiers safe. It was not until the very end of his letter that Leonardo mentioned other contributions he could make, stating,

In time of peace, I believe I can give perfect satisfaction … in architecture … and in guiding water from one place to another.⁴

He then went on to mention that he was a sculptor and that he could paint "as well as any other."⁵ A draft copy of this letter has survived, but it is not known if Leonardo actually sent such a letter to Ludovico.

However, it was not Leonardo’s war machines or his art that actually brought him to Milan. It was his talent as a musician. Leonardo was known both for his fine

“What is fair in men, passes away, but not so in art.”⁶

—Leonardo da Vinci
singing voice and for his ability to play the lyre, an instrument similar to the violin. It is not clear if he was sent to Milan by Lorenzo de’ Medici to get him out of Florence or if Leonardo had been invited to Milan by Ludovico Sforza. In either case, Leonardo’s first role in Ludovico’s court was as an entertainer.

Leonardo arrived in Milan probably some time in 1482. At that time, Milan was larger than Florence, with an approximate population of 80,000. While Florence was famous for its art, Milan was better known as a place of science and learning. The city

**Designing the Ideal City**

During Leonardo’s first years in Milan, people were dying of the plague. By the time the plague ended, more than 10,000 of Milan’s citizens had died.

At the time, no one really understood what caused the plague or how it spread. While Leonardo did not know that the plague was caused by bites from infected rats and fleas, he had an idea that the filth of the city led to the spread of the disease. In the fifteenth century, plumbing did not exist. People disposed of waste into the streets. As a result, the city’s drinking water was contaminated by human and animal waste. In addition, the city was horribly overcrowded where the poor lived.

Leonardo designed a new kind of city—one in which disease would not spread. His idea was to build a city with streets on two levels. The bottom level was for the poor. (Leonardo and others of his social class did not worry too much about the poor.) The top level, where the “better” citizens would live, had wide streets and open spaces for parks. There would be plumbing, drainage, and waste disposal. This was unheard of at the time. Leonardo’s ideal city was never built, but he made many sketches of his design.
was home to a large university and one of the finest libraries in Italy. It was also a major publishing center for books. As a result, Milan was filled with opportunity for Leonardo. Fewer artists meant less competition for commissions. There would also be opportunities for Leonardo to satisfy his growing interest in many areas of science.

**A Specific Contract**

The first record of Leonardo’s presence in Milan is a contract for a painting. In April of 1483, Leonardo and two other artists were commissioned to paint an altarpiece. The contract spelled out exactly what was expected. The painting was to include one large center panel depicting the Madonna and the Christ Child with angels and prophets. The Madonna’s gown was to be blue and gold. Halos were to be painted over the heads of the figures. The two smaller side panels were to depict groups of angels singing or playing musical instruments. The contract also mentioned another requirement: the panels must fit into an existing frame that the artists would have to paint and repair.

**A Gift**

In 1497, Leonardo received three acres (1 ha) of land just outside the walls of Milan. The land included a house, vineyard, and gardens. It was a gift to Leonardo by Ludovico Sforza.
The three artists divided the work. One artist was in charge of repairing and painting the frame. Another artist was responsible for painting the side panels. Leonardo was responsible for painting the center panel.

Leonardo did finish this painting, which is called *The Virgin of the Rocks*. However, his work did not match the description set out in the contract. The center panel does show the Madonna and Christ Child, but Leonardo left out the prophets and most of the angels. He also left out the halos, which was considered shocking. And he added something the contract had not specified. He included an image of John the Baptist—cousin of the Christ Child—as an infant.

While Ludovico did not commission the painting of *The Virgin of the Rocks*, he may have recommended Leonardo for the job. Ludovico eventually did become the artist’s patron. For the next few years, Leonardo painted portraits, decorated palace ceilings, and built canals. He also designed spectacles.
such as the egg-shaped set to celebrate the marriage of Ludovico’s nephew.

The Bronze Horse

In 1489, Leonardo received his first truly important commission from Ludovico. He was asked to create a bronze statue in honor of Ludovico’s father, Francesco Sforza. The statue was to show a horse and its rider. This was an enormous task.

Leonardo began working on the project in 1491. He kept records of his work in his notebooks. He included measurements for the statue and instructions for casting the bronze. He made sketches of the mold and of horses in different poses. Leonardo made a full-size model of the statue from clay that would then be used to create a mold. The statue would be cast by pouring melted bronze into the mold.

The clay model of the horse went on display in 1493. The next step was to melt the tons of bronze that had been collected to cast the statue. However, this never took place. This time, Leonardo’s failure to complete a commission was not his fault. French soldiers were camped outside Milan, threatening to invade the city. Ludovico ordered the bronze to be used to make cannons instead of the horse.
The Last Supper

Approximately two years later, Ludovico again commissioned Leonardo to paint a mural in the dining hall of a monastery in Florence. The painting was to depict one of the most important events in the Christian faith, the Last Supper. This was the meal shared by Christ and his closest followers on the eve of Christ’s death.

Leonardo filled pages and pages with sketches and ideas. He described the smallest details. For example,
he wrote that one of the figures "holds a knife in one hand, and in the other the loaf half cut through by the knife." He described another figure who "has turned his head toward the speaker." Leonardo drew heads and hands of the figures that would appear in the final painting. Some of these figures were modeled after citizens of Milan.

Leonardo’s assistants helped him with the painting of the mural. Even so, it took several years to complete. This was partly because the mural was such an enormous task and because Leonardo could not work on it continuously. He had other projects to complete for Ludovico. However, when the 15-foot by 29-foot (4.6-m by 8.8-m) mural was completed two years later, it was considered a masterpiece.

Unfortunately, there were problems with the finished painting. Traditional fresco painting involves
applying tempera paint to wet plaster. This means that the artist has to paint quickly. That was not how Leonardo preferred to work. He decided to mix tempera and oil paints and paint on dry plaster. Thus, his painting is considered a mural rather than a fresco. This allowed him to work more slowly and to repaint sections if he wanted. Unfortunately, the experiment was a failure. The paint soon began to flake off the wall. The situation was made worse by the dampness of the monastery walls.

The latest restoration of *The Last Supper*, which was finished in 1999, took 20 years. Paint was carefully removed from earlier restorations to find as much as possible of the original paint. This restoration more closely matches the original work. Still, only about 20 percent of what remains on the monastery wall was actually painted by Leonardo.

The French Invasion

In May 1499, France invaded Italy. On September 2, Milan fell to the French. Their archers used the clay model of Leonardo’s horse for target practice and destroyed it.

Leonardo was still in Milan a month later when Louis XII, the king of France, entered the city. By December, the artist settled his affairs and packed his household. After 17 years, it was time to leave Milan.
Leonardo's Virgin on the Rocks
One of the Codex Forster notebooks that once belonged to Leonardo. The notebook shows a drawing of hair and skin on the human head.

The Notebooks

During his time in Milan, Leonardo became serious about what would become one of his most important projects. For years, he had scribbled notes and made sketches on scraps of paper. He recorded all kinds of things. He made lists
of supplies and what they cost. He noted titles of books he wanted to read. He made observations of nature and sketched ideas for paintings, sculptures, and inventions.

In the mid-1480s, instead of writing on scraps of paper, Leonardo began to write in heavy paper notebooks bound in leather. When one notebook was full, he started another.

Even in his notebooks, Leonardo could not focus on one thing for long. On a single page he might write a story, make a sketch of a man’s head, and record what he ate for dinner. Then he might add a list of household expenses and a few sentences from a letter he planned to send. Jumping from topic to topic made his notebooks confusing. However, this was how Leonardo’s mind worked. He was interested in so many things—and he felt a need to write about them all.

Leonardo had a grand plan to eventually organize his writing. He intended to publish books on 20 topics. These included painting, anatomy, physics, botany, astronomy, architecture, and more. Leonardo laid out his plans, making no excuses for his lack of organization or for returning to topics again and again.
He wrote in a notebook,

And this is to be a collection without order, taken from many papers which I have copied here, hoping to arrange them later each in its place, according to the subjects of which they may treat. But I believe that before I am at the end of this [task] I shall have to repeat the same things several times.²

Leonardo explained how to mix paints and how to show perspective. He wrote about how to observe the sun and moon and how to build an arch. He described human muscles and blood vessels and the wings of birds. He also drew maps and sketched the most fantastic inventions.

Companionship and Solitude

Leonardo never married nor had children of his own. Still he had many friends and companions throughout his life.

Despite his friendships, Leonardo also believed that time spent alone was important, especially for an artist. In his notebooks, he wrote his thoughts about how a student painter should live:

... the painter ... must remain solitary ... While you are alone you are entirely your own [master] and if you have one companion you are but half your own ... And if you have many companions you will fall deeper into the same trouble ... you will not be able to help often listening to their chatter. ... And if you must have companionship find it in your studio. ... All other company may be highly mischievous.³
Personal Life

Leonardo’s notebooks are one of the best sources available today to learn about the artist. Many of the entries give historians a glimpse into his personal life. For example, in 1490, Leonardo recorded a change in his household. At the age of ten, Giacomo Caprotti arrived at Leonardo’s studio as a servant and painter’s model. He may also have come to study with Leonardo, who soon nicknamed the boy Salai.

Salai did become a capable, if not gifted, artist. However, it appears he fell somewhere between pupil and family member in Leonardo’s eyes. Leonardo mentions traveling with Salai and sending him to deliver letters and collect money for work done by Leonardo’s studio. In his will, Leonardo left Salai half of the land he owned in Milan, along with a house Salai had built there.

Advice, Sketches, and Comments

The topic of painting filled many pages of Leonardo’s notebooks. He had strong feelings about art and artists. Leonardo asserted that an artist must study nature in order to paint. He also believed the artist’s mind should be similar to a mirror that reflects objects. His advice for artists ranged from mixing paints to drawing shadows.

Leonardo continued to write and sketch in his notebooks for the rest of his life. He usually took his current and completed notebooks with him wherever he went. About 7,000 pages of his writing and drawings have survived. However, it is estimated that he filled approximately 20,000 pages.
Possibility of Human Flight

Leonardo devoted many pages to writing about birds and flight. The artist had always been fascinated by the idea of a human flying like a bird. He observed birds...
and bats and how they moved through the air. He even dissected, or cut open, dead birds to study the bones and muscles of their wings.

Leonardo was sure that it was possible to invent a machine that would allow a man to fly. He wrote that the wings of the machine should imitate those of a bird or a bat. He was confident that with large enough wings, a man could succeed in creating a machine that would fly.

Leonardo’s notebooks were filled with sketches of flying machines. One sketch showed a device in which a man stood upright and used his arms to move a pair of large wings. Another drawing showed a man hanging from a flying machine and pedaling to flap the wings. He even drew a machine that looks similar to a helicopter and another that is very similar to a parachute.

A Private Collection
One set of Leonardo’s papers was lost until 1690, when it was found in a trunk in Rome. The 72-page collection (written in Leonardo’s backward style) is known as the Codex Leicester. The pages detail Leonardo’s observations, notes, and drawings of water and how it moves. It also contains scientific notes pertaining to light and gravity.

In 1994, American Bill Gates, the founder of Microsoft, bought the collection at an auction. He paid over $30 million. Today, it is the only codex that belongs to a private individual.
Did Leonardo actually ever build and try out any of his ideas for flying machines? An entry in one of his notebooks seems to suggest that he may have done so. He wrote:

*The great bird will take its first flight;—on the back of his great swan,—filling the universe with wonders; filling all writings with his fame and bringing eternal glory to his birthplace.*

Some historians believe that the “great swan” refers to a mountain near Florence where Leonardo was at the time he wrote the note.

If Leonardo did try out one of his flying machines, there is no record of the experiment. Perhaps it never happened. Or perhaps he did try a machine out, and the attempt failed.

**Other Inventive Ideas**

Sketches and notes for flying machines were not the only inventions found in Leonardo’s notebooks. Leonardo imagined a machine that could travel under water—similar to a modern submarine. He sketched a diving suit and a coat that could be filled with air to
save a shipwrecked sailor. He also diagrammed an underwater breathing device. He drew a spinning wheel with an automatic yarn twister and a crane-like device for lifting heavy objects.
One of Leonardo’s interesting ideas was an automaton, or type of robot. The figure was dressed in armor, similar to a knight. Gears let the legs bend, the arms move, and the head turn. A drum inside of the knight turned automatically, creating a kind of voice. A model of the automaton was created in Leonardo’s studio and displayed in Milan in 1495.
First transcript of Leonardo's Treatise on Painting, in which he describes artistic and technical drawing.
In December 1499, Leonardo packed up and left Milan. Until this time, the artist had led a fairly settled life. His entire childhood was spent in Vinci. He then lived approximately 16 years in Florence and another 17 years in Milan. However,
Leonardo’s departure from Milan marked the beginning of a new and very different kind of life. For most of the rest of his life, he would spend a few months in one place, a few years in another.

Leonardo traveled about 75 miles (121 km) southwest from Milan to the city of Mantua. He was the guest of Isabella d’Este, a rich and intelligent woman whose family ruled the city.

Isabella had probably met Leonardo in Milan, and now she wanted Leonardo to paint her portrait. Only a colored chalk sketch of Isabella has survived. Perhaps Leonardo used the sketch as a cartoon for the finished portrait.

By March 1500, he was in Venice, on the northeastern coast of Italy. A musician who lived in the city wrote a letter to Isabella and mentioned that Leonardo was in the city. The musician also told Isabella that he had seen a portrait of her painted by the artist.

**Return to Florence**

By April, Leonardo was back in Florence for the first time in 18 years. The city had changed. Six years
earlier, in 1494, the Medicis had been forced out of power. Florence had become a republic ruled by a group of wealthy citizens. The artist’s family had changed, too. His elderly father was still working as a notary. But by now, Ser Piero had 11 legitimate children—Leonardo’s half-brothers and half-sisters.

Leonardo returned to the city as a respected artist and had no trouble finding work. He soon received an important commission to paint an altarpiece for one of the richest churches in the city.

A short visit to Rome in 1501

A Rival and His Work

Michelangelo was only a boy when Leonardo left Florence in 1482. When Leonardo returned to Florence in 1500, Michelangelo was 25 and a respected artist known for his remarkable ability as a sculptor.

In 1501, Michelangelo began work on a statue that became one of his most famous pieces, a statue of the biblical boy David who defeated the giant Goliath with a slingshot. By the middle of 1503, the 16-foot (5-m) tall statue was almost completed.

In January of 1504, city officials organized a committee of 30 citizens, including Leonardo, to decide where to place the statue David. Leonardo may have resented Michelangelo’s fame—he suggested the statue be placed in an out-of-the-way location. However, the marble statue was placed outside the main entrance of the Palazzo Vecchio, one of the most important public buildings in Florence. It remained there for centuries before it was moved to a gallery to keep it from being destroyed by wind and weather. Today, a reproduction of the statue is placed where the original once stood.
interrupted his work on painting the altarpiece. His progress was slow. A letter from a monk to Isabella d’Este states that other than the cartoon for the altarpiece, Leonardo had done nothing and that the artist “has no fondness at all for the paintbrush.” Leonardo never did complete the commission. The monk may have been partly right—Leonardo had lost interest in painting. At this point, his mind was occupied with mathematics and engineering.

A Military Engineer

By the summer of 1502, Leonardo was ready to leave Florence again. He had a new position as a military engineer for Cesare Borgia (who was the son of Pope Alexander VI). The pope had placed Borgia in charge of his army.

This was not a peaceful time in Italy. The French had invaded Milan. Venice was battling the Ottoman Empire to the east. Florence was at war with Pisa, a city-state less than 50 miles (80 km) away. However, Borgia

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Poetry versus Painting

Leonardo used a battle scene as an example when comparing the work of a poet and a painter.

“And if the poet gratifies the sense by means of the ear, the painter does so by the eye—the worthier sense; but I will say not more of this but that, if a good painter represents the fury of a battle, and if a poet describes one, and they are both together put before the public, you will see where most of the spectators will stop, to which they will pay the most attention, on which they will bestow most praise, and which will satisfy them best.”
had a grand plan. He wanted to conquer all of Italy and unite it.

Leonardo hated war, so this new position might appear to be a strange choice. However, he was very interested in military engineering. His notebooks were filled with sketches and notes about war machines, weapons, and ways to defend a city against enemy attack. So, while Leonardo hoped for peace, he knew his skills might prove useful in ending war.

As Borgia’s military engineer, Leonardo traveled all over Italy. He visited different cities, mapped them, and suggested ways to defend them from attack. However, his travels lasted only about six months. In 1503, Pope Alexander VI died and Cesare Borgia was out of power.

A New Commission

When Leonardo returned to Florence in the spring of 1503, city officials were discussing ways to honor the founding of the republic. Their plan was to commission two enormous frescoes. The paintings
were to be done on opposite walls within the council hall that was built in 1495. One fresco would depict the Battle of Anghiari, in which Florence defeated Milan in 1440. The other fresco would depict the Battle of Cascina, fought against Pisa in 1364. These frescoes were important projects. The work would go to the two most talented artists in the city—one a master painter and the other a young artist with great potential. Leonardo received the commission to paint the Battle of Anghiari. Michelangelo Buonarroti was assigned to work on the other fresco. Michelangelo was more than 20 years younger than Leonardo, but he was already an important artist in Florence.

Leonardo and Michelangelo were rivals. While each respected the other’s talents, it appears they did not like each other. Competing for important commissions may have been the issue.

The Missing Battle of Anghiari

The hall where Leonardo painted the Battle of Anghiari fresco is still standing in Milan. However, there is no visible sign of the painting. Fortunately, there are clues to the fresco’s appearance. Several artists painted copies of the fresco on wooden panels. There is also an engraving believed to be based on Leonardo’s original cartoon. And his notebooks were filled with sketches of ideas for the fresco.

Some experts think the Battle of Anghiari was painted over in the 1560s by Giorgio Vasari, who also wrote the first biography of Leonardo. Other experts believe Vasari’s painting may actually be painted on a wall that was built in front of Leonardo’s painting, allowing room to protect Leonardo’s work.
Leonardo spent several months working on his ideas for the fresco. He created clay models and drew dozens of sketches. He wrote notes about how to depict a battle scene. He described the air as filled with smoke, dust, and arrows. The ground would be covered with dead soldiers and horses in a heap.

Leonardo put his ideas together to draw a full-size cartoon on paper pieced together inside a huge wooden frame. The cartoon was so large that Leonardo
designed a special platform on wheels. He used the platform to move around from one part of the cartoon to another.

Leonardo and his assistants started painting the fresco in December 1504. As usual, the work went slowly. And, just as with The Last Supper, there were problems. It appears that Leonardo may have used a poor quality of oil for his paints. The paint did not adhere to the wall. Although a large part of the wall was painted, the entire fresco was never finished. Once again, Leonardo failed to complete a commission.

Michelangelo’s fresco never got past the cartoon stage. He was sent to Rome to work on a different project for the pope. He did not have time to begin painting his fresco.

The Mysterious Woman

While working on the Battle of Anghiari, Leonardo was also occupied with another project. He was still adding touches to a painting he had started in 1503. It was the Mona Lisa, which would become one of the best-known

**Ser Piero’s Passing**

In 1504, Leonardo wrote a significant event in his notebook—the death of his father, Ser Piero, on July 9. He noted that Ser Piero left ten sons and two daughters.

Ser Piero’s worldly goods were left to his legitimate children. Leonardo was not mentioned in his father’s will.
Inspiration
Who inspired the Mona Lisa painting? It could have been Lisa Gherardini, the wife of a Florence silk merchant, or Isabella of Aragon, whose wedding spectacle Leonardo designed. She might be Leonardo’s mother, Caterina, or a self-portrait of sorts of the artist himself. The inspiration remains as mysterious as her smile.

and best–loved paintings of all time. It was an unusual painting for the time because Leonardo showed the woman looking directly at the viewer rather than off into the distance, her lips turned up in the slightest of smiles.

The Mona Lisa is a fairly small painting—approximately 30 inches by 21 inches (76 cm by 53 cm). Still, Leonardo worked on it for more than four years. He painted with oil paints and used brushes that were so fine that it is impossible to see the individual brush strokes. According to legend, he never considered the painting complete and took it with him when he traveled.

In 1506, Leonardo asked city officials for permission to leave Florence. Because he still had not finished the Battle of Anghiari, he was told to return in three months or face a fine.

Leonardo packed his belongings, including the unfinished Mona Lisa, and headed for Milan.
Leonardo da Vinci

The Mona Lisa painting in the Louvre museum in Paris, France
When Leonardo arrived in Milan in 1506, the city was under the control of the French. France’s King Louis XII was a great admirer of Leonardo. The king’s representative, Charles d’Amboise, warmly
welcomed the artist and invited Leonardo to stay as a guest in the castle.

Leonardo was also presented with a commission to design a garden and villa, or country home, for d’Amboise. Leonardo made notes and sketches of a garden filled with orange and lemon trees. He visualized a garden brook with grassy banks and a net overhead to keep songbirds from flying away. A small windmill would create cooling breezes and power musical instruments. And for the villa, the artist planned large, light-filled rooms that would open into the garden.

The three months that the Florence officials allowed Leonardo were soon up. He was due back in Florence to complete the *Battle of Anghiari*. However, he did not want to leave Milan. His new patron, Charles d’Amboise, did not want Leonardo to leave. He requested that Leonardo be allowed to remain in Milan to finish projects he had started.

Leonardo was given permission to stay another month, until September. However, he did not return to Florence then, either.

King Louis XII had seen a painting

“This depicting of mine of the human body will be as clear to you as if you had the natural man before you…”

—Leonardo da Vinci
of Leonardo’s and wanted the artist to paint for him. A letter was sent to Florence. In part, it said, “We have necessary need of Master Leonardo da Vinci, painter of your city of Florence.” The letter went on to say that Leonardo should not leave Milan before the French king arrived. France was powerful, so the officials of Florence had no choice. Leonardo was allowed to stay in Milan, where he received a salary as a court painter.

Return to Florence

When Leonardo finally did return to Florence, it was not because he had been forced to do so. And it was not

The Vitruvian Man

One of Leonardo’s drawings of the human body has become a symbol of the artist. This sketch, known as the Vitruvian Man, shows a man standing with his legs and arms in two different positions. In one position, the man’s legs are together and his arms are held out straight from the shoulders. In the other position, the man’s legs are spread apart and his arms are raised above his shoulders. The entire figure is enclosed in a square. The square is enclosed in a circle. The man’s feet are firmly planted on these shapes. The tips of his fingers touch the edge of the shapes.

Below the drawing, Leonardo wrote two sentences to explain its significance. The first sentence refers to the man standing with his arms and legs straight. It states that a man’s outstretched arms are equal in length to his height. The second sentence describes the man with his legs apart and arms raised slightly. It observes that spreading the legs and raising the arms so the fingertips are level with the top of the head means that the navel, or belly-button, becomes the center of the figure.

This drawing is known less for its use in determining proportions than for the way it captures the beauty of the human body. The body is done with simple lines; the man’s face is shown in detail.
to finish the *Battle of Anghiari*. He returned for personal reasons. Leonardo had received nothing when his father died. Ser Piero’s entire estate had gone to his legitimate children. Perhaps because of this, Ser Piero’s younger brother, Francesco, had changed his own will. At one time, Francesco had promised to leave everything he owned to Ser Piero’s legitimate children. In his new will, he left everything to Leonardo.

Francesco died in 1507. One of Leonardo’s half-brothers immediately challenged Francesco’s will. The French king reluctantly allowed Leonardo to leave to deal with the matter. The artist traveled to Florence and stayed with a wealthy art patron.

The legal case took months. Leonardo devoted much of this time to the study of anatomy—the workings of the human body. Understanding how the body worked was necessary for painting human figures that appeared alive and real. Leonardo would have studied anatomy as part of his training with Verrocchio. About 20 years earlier, he had studied and sketched things such as the

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**Immovable Art**

According to some stories, King Louis XII of France wanted to take Leonardo’s *The Last Supper* back to France with him. However, because the work was a mural and was painted on a wall, this was impossible.
muscles and nerves of the neck and shoulder and the blood vessels of the face.

Most of what he learned about anatomy would have come from the work of anatomists. An anatomist studied the body by dissecting criminals who had been executed. In a dissection, a body was carefully cut open so the various organs could be observed and sketched.

There were problems with dissection, however. The Catholic Church opposed the practice. According to the church, the body was sacred. It was created by God. As a result, it was a sin to study the body’s workings as you would study a machine.

While waiting for his legal case to be settled, Leonardo concentrated on anatomy. These studies focused more on the internal workings of the body than his earlier studies had. As an artist, Leonardo observed things such as how the muscles moved under the skin. This helped him draw figures that looked lifelike. Now he wanted to understand how blood flowed and how the eyes worked. He was
approaching anatomy more as a scientist than as an artist.

Leonardo wrote about sitting with an old man before his death and later dissecting the man’s body. He also mentioned dissecting the body of a two-year-old boy. He wrote that the bodies of the old man and the child were opposite in every way.

Leonardo’s observations led him to theories about the body and how it worked. He believed that the process of aging led to less blood going to the heart. He observed that an old person’s veins “thicken so much in the walls that they become closed up and leave no passage for the blood. …” Today, scientists know that the thickening of blood vessels does lead to heart attacks.

Leonardo made detailed sketches during this stay in Florence. He drew the individual muscles of various parts of the body. He drew cross sections of the eye and its parts. He made observations about bodily functions such as breathing, swallowing, and weeping.
It was also during this time in Florence that Leonardo started planning the publication of his work. Before leaving Florence in 1506, Leonardo had stored his notebooks and papers. Now he began the huge task of organizing his notes by topic. He wrote,

_Begun at Florence … on 22 March 1508. This will be a collection without order, made up of numerous sheets that I have copied up, hoping later to put them in order, in their proper places, according to the subjects which they treat._"
It is not known how the matter of Francesco’s will was settled. However, Leonardo probably returned to Milan by the spring of 1508.

**Back in Milan**

Several apprentices studied in Leonardo’s Milan studio. For the next few years, Leonardo and his assistants were busy. During this time, Leonardo worked on several paintings, including adding touches to the *Mona Lisa*. He also started a design for a monument in honor of an official of Milan. Similar to the sculpture he had planned for Ludovico Sforza, this monument featured a horse and rider. Leonardo made sketches of the statue. He also listed expenses for the project, including the cost of supplies and labor for polishing the finished sculpture. However, it seems that once again, this project never went beyond the design stage.

Leonardo did accomplish a different project in record time. He started a new notebook in September. By October, he had filled 192 pages with sketches and his cramped, backward writing. This notebook was

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**Setting the Stage**

Some of Leonardo’s time in Milan was spent designing stage sets for festivals and pageants. His notes from these years include sketches of a set with mountains that open to show a cave. The artist also drew a diagram to show how pulleys and weights would be used to open the mountain.
titled *Of the World and Its Waters*. Leonardo wrote about the sea, running water, and a digging machine that might have been intended for making canals. Despite the title, this notebook also included notes and sketches about flying machines, the sun, and other topics.

In 1511, Charles d’Amboise, Leonardo’s patron, died. By the end of the year, the Swiss army was advancing on the city of Milan. Leonardo witnessed a Swiss attack on the city and drew a picture of the fires that resulted.

The following year, the French lost control of Milan. The city was once again in the power of the Sforza family. Leonardo, who had been friendly with the French, knew he would not be welcome in the new court. His three-month stay in Milan, which lasted nearly seven years, was over. It was time to move on once more.
Leonardo sketched hundreds of inventions during his lifetime.
According to an entry in a new notebook, Leonardo left Milan for Rome on September 24, 1513. He also noted the expense of moving 500 pounds (227 kg) of clothing, furniture, and personal items. This would have

**Leonardo in France**

St. John the Baptist, pointing toward heaven, is probably Leonardo’s last painting.
included all of his notebooks, the *Mona Lisa*, and several other paintings.

On his way south, Leonardo stopped in Florence for a short visit. He was in Rome by the end of October. Although the artist had visited the city before, he had never lived there.

Leonardo was given the use of a large apartment in the Villa Belvedere. This palace was the summer home of Pope Leo X. Along with Leonardo, the apartment housed Salai and several others who may have been the artist’s pupils.

Leonardo was now in his sixties and by the standards of the time, he was an old man. He may not have been in good health. In a letter written in 1515, Leonardo mentions an illness. In a diary, a church official mentions that the artist’s right hand was paralyzed. Leonardo may have had a stroke.

The Villa Belvedere, some distance from the busy city of Rome, was surrounded by woods, orchards, and gardens. Little is known of Leonardo’s life there, but he did start a new notebook that focused on geometry. He may also have worked on what may have been his last painting—*St. John the Baptist*, the patron saint of Florence.
Leonardo had another project, too. He was experimenting with mirrors. His notebooks describe his thoughts about solar power. While this was not a completely new idea, Leonardo was thinking on a larger scale than anyone had before. He described using mirrors to focus the sun’s rays to make water boil.

In October 1515, Leonardo set out on a trip to Bologna, Italy. The purpose of the journey was a meeting between the pope and the new king of France, François I. Leonardo was part of the pope’s traveling party.

**A Last Account**

Antonio de Beatis, secretary to a cardinal, was the last to write an account of a personal meeting with Leonardo. First, de Beatis mentioned three paintings that Leonardo showed to his guests, the *Mona Lisa*, *St. John and the Virgin*, and *Child with St. Anne*. He went on to write these words:

_However we cannot expect any more great work from him, since he is somewhat paralysed in his right hand … And while Master Leonardo can no longer colour with such sweetness as he used to, he is none the less able to do drawings and to teach others. This gentleman has written a great deal about anatomy, with many illustrations of the parts of the body, such as the muscles, nerves, veins and the coilings of intestines, and this makes it possible to understand the bodies of both men and women in a way that has never been done by anyone before. All this we saw with our own eyes, and he told us he had already dissected more than thirty bodies, both men and women, of all ages. He has also written, as he himself put it, an infinity of volumes on the nature of waters, on various machines, and on other things … and if these were to be brought to light they would be both useful and delightful._2
The trip was slow, with stops at several cities along the way. By the end of November, the group had arrived in Florence. The week spent there was Leonardo’s last visit to this city.

In early December, the pope and his followers reached Bologna. Leonardo was present at the meeting between Pope Leo X and King François I. The young king was only 21 years old, but he certainly knew of Leonardo’s work, as the previous king had been a great admirer of the artist. This meeting would lead to a major change in Leonardo’s life.

Leonardo returned to Rome with the pope’s party. However, he did not stay long. In the late summer or early fall of 1516, he packed up his notebooks and several paintings, including the Mona Lisa. Then he set out for France.

Life and Death in France

This was the longest and most difficult journey Leonardo had ever taken and included crossing the Alps. Salai probably went with the artist as far as Milan.
There they parted. The younger man stayed in Milan, tending to the house and gardens Leonardo owned there.

Leonardo was settled in France by the end of the year. Records show that he was given a generous yearly salary. The same records also name Leonardo as the king’s official painter.

François clearly valued Leonardo for more than his ability as a painter. This was noted in a diary of a sculptor who also served the French king. One entry described the king’s admiration for Leonardo, stating,

*I cannot resist repeating the words which I heard the King say of him. He said he could never believe there was another man born in this world who knew as much as Leonardo, and not only of sculpture, painting and architecture, and that he was truly a great philosopher.*

In addition to a salary, François provided Leonardo with a large red brick and gray stone house. A room on the second floor was Leonardo’s studio. A housekeeper was provided to see to his needs.
In the comfort of this house, Leonardo once again began to organize his notes and sketches. He also requested books to read and filled pages in new notebooks. However, despite his title as official painter, there is no evidence that he did any painting.

Leonardo also spent time planning a new palace and grounds for the king. His design featured a system of canals between two rivers. In addition, he worked on special events such as the marriage of François’s niece in 1518. For this event, Leonardo designed an arch that bore a figure holding a dolphin in one hand and flowers in the other. He also organized a spectacle of a battle that had occurred several years earlier. Fiery missiles and balloons rained down on the crowd. Sketches in his notebooks showed that he also designed costumes for these events.

That same year, Leonardo gave a party to thank the French king for his generosity. A witness described the event in a letter:

The whole courtyard was canopied in sheets of sky-blue cloth which had stars in gold in the likeness of the heavens, and then there were the principal planets, with the sun on one side and the moon on the other: it was a wonderful sight.
This description sounds familiar. The event appeared to be a repeat of the *Il Paradiso* masque Leonardo had staged for Ludovico Sforza in 1490.

On April 23, 1519, at the age of 67, Leonardo wrote his will. He wanted to be laid to rest in France. He requested three high Masses and 30 low Masses to be said in his memory. He specified how many candles were to be placed in the church for these services.

Leonardo also detailed the division of his property. His books and art work were left to Francesco Melzi, who had been his student and had acted as his secretary. Salai was left half of Leonardo’s land in Milan and the house. The other half of the land went to another servant. The artist left his housekeeper in France “a cloak of good black cloth lined with fur, and a length of cloth” as well as a small amount of money. He even left something to his brothers in Florence, despite the hard feelings between them due to Francesco’s will.

Leonardo did not live long after making his will. He died just days later on May 2, 1519. As he had requested, he was buried in France.
Leonardo’s self-portrait
Leonardo da Vinci left a remarkable legacy. He is remembered as one of the greatest artists in history. He is also remembered as a scientist. Because of the way he gathered information and drew conclusions, he is considered one of the first
whose writings reflect the scientific method. First Leonardo asked a question, such as "How do birds fly?" Then he observed carefully. Finally, he wrote his conclusions based on his observations.

History has shown just how advanced many of Leonardo’s scientific ideas were. In 1609, Galileo perfected the telescope. Almost 100 years earlier, Leonardo had described using curved mirrors to observe the moon. In a brief note he wrote, "Construct glasses to see the moon magnified." In 1628, an English doctor named William Harvey published his discovery of the circulation of blood. Leonardo had devoted pages of his notebooks to discussing and sketching the paths of blood in the human body. Isaac Newton, an English scientist, published his ideas about gravity and motion in 1687. One of his theories was that objects at rest tend to remain at rest. Two centuries before this, Leonardo had observed that objects do not move unless something causes them to move.

Leonardo’s inventions were centuries ahead of their time. He drew machines that bear startling likenesses to modern helicopters, tanks, and submarines.
Historians are fortunate to know as much as they do about the workings of Leonardo’s mind. However, a considerable amount of his work has been lost. As few as 20 paintings have survived. Of these, some were only partly painted by Leonardo. And most of the paintings have been damaged by time or mistreatment. Less than half of Leonardo’s notebook pages still exist. Many of these pages, too, have suffered damage.

Still, millions of people visit museums and other sites to view what is left of Leonardo’s work. One popular work is the artist’s famous mural in Milan, The Last Supper. It is amazing that it even exists today as the paint began to flake off during Leonardo’s lifetime. More damage occurred in 1796 when Italy and France were once again at war. Napoleon’s forces took control of Milan. His men used the monastery where The Last Supper was painted as a stable for their horses. They threw bricks at the mural. A century and a half later, during World War II, the

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**Stealing Mona Lisa**

On August 22, 1911, art lovers around the world were shocked to learn that the Mona Lisa had been stolen from the Louvre. Two years later, an antique dealer received a letter from a man who claimed to have the painting. Police investigated and found the painting hidden in the bottom of a suitcase. The thief, an Italian citizen who had worked in the Louvre, apparently intended to take all paintings by Italian artists from the museum. He wanted to return them to Italy, where he believed they belonged. The Mona Lisa was returned to the Louvre museum in Paris.
monastery was heavily bombed. Only the wall survived. The mural was protected by sandbags. The monastery and the mural have been restored.

Each year, millions of visitors go to Paris to see the Mona Lisa. This small painting is on display at the Louvre, France’s most famous art museum. How did it end up there?

In his will, Leonardo left the paintings he had with him in France to his friend and former pupil, Francesco Melzi. This included the Mona Lisa. Francesco Melzi must have sold the painting to Leonardo’s last patron, King François I of France. The painting belonged to the French royal family for hundreds of years. At one time, it even hung in a palace bathroom! In 1797, the painting was donated to the Louvre.

Organizing Leonardo’s Notebooks

What happened to Leonardo’s notebooks, which were also left to Francesco Melzi? Leonardo’s friend had good intentions. He hired two assistants to help organize the artist’s notes on painting and put them together in book form. They did manage to put the book together. However, for unknown reasons, the book was not published until more than a century after Leonardo’s death.
Like others, Melzi tried to organize Leonardo’s work on other subjects, but was never able to do so. Still, he clearly valued the notebooks and set aside a room in his house to display them. Visitors read the notebooks and viewed the sketches. Unfortunately, some of these visitors also took pages away with them.

Francesco Melzi died in 1570. He left Leonardo’s papers and notebooks to Orazio Melzi, who was either his son or his nephew. Orazio clearly did not value Leonardo’s work as Francesco had. He put many pages in storage. He sold or gave away others.

## The Notebooks Today

Nine collections of Leonardo’s work are in libraries and museums in Europe, including:

**Codex Arundel**: a design for a new city and notes on geometry, architecture, and weights. (British Library, London)

**Codex Atlanticus**: more than 1,000 pages of scientific topics. (Biblioteca Ambrosiana, a library in Milan, Italy)

**Codex Trivulzianus**: literature, architecture, and other subjects. (Biblioteca Trivulziana, a castle library in Trivulziana, Italy)

**Codex “On the Flight of Birds”**: 17 sheets of sketches and notes about birds, flight, air resistance, and air currents. (Biblioteca Reale, a library in Turin, Italy)

**Codex Ashburnham**: sketches and drawings. (Institut de France in Paris, France)

**Codices of the Institut de France**: 12 notebooks on flight, optics, geometry, and military art. (Institut de France in Paris, France)

**Codices Forster**: thoughts on geometry, the crossbow, and water-powered machines. (Victoria and Albert Museum in London, England)

**Windsor Folios**: 600 unbound drawings. (Windsor Castle, Windsor, England)

**The Madrid Codices**: science notebooks found in Madrid’s National Library in 1966. (Biblioteca Nacional de España, a library in Madrid, Spain)
An Italian sculptor named Pompeo Leoni collected many of Leonardo’s notebooks. In 1603, while living in Spain, Leoni decided to organize part of Leonardo’s work. He planned to create two separate collections. One collection would include Leonardo’s notes about art. The other would relate to science.

The results were disastrous. Leoni cut some pages apart to separate notes about art from those about science. Then he pasted the cuttings together in book form. Leoni never sold the notebooks. After his death in 1608, some of the notebooks went to his heirs in Italy who may have sold two of the notebooks. These books ended up in the collection of a man who later left them to the King of Spain.

In a matter of years, Leonardo’s writing and sketches were scattered all over Europe. Pages went to art collectors or dealers. Others became part of private collections and libraries. Some simply disappeared.

It was more than two centuries before another serious attempt was made to organize the remaining notebooks.

Making a Copy

Although only about 20 of Leonardo’s paintings still exist, there are two versions of one painting. The monks who commissioned *The Virgin of the Rocks* painting felt Leonardo did not depict the subject as they had specified and, therefore, did not fulfill the guidelines of the commission. Leonardo agreed to do another painting. Today, the first version hangs in the Louvre Museum in Paris. The second version is in the National Gallery in London.
notebooks. Jean Paul Richter studied as many of the notebooks as could be located in Europe. He used Leonardo’s notes about the books he wanted to publish as a guide for organization. His two-volume set was published in 1883 as *The Literary Works of Leonardo da Vinci*. The books included the original Italian text and the English translation.

In the early 1900s, a group of scholars got together with the goal of organizing the notebooks once again. However, this time the purpose was not to publish Leonardo’s works as books. It was to organize the original work so it could be preserved. The group separated the original papers and notebooks into collections called codices. Today, all but one of these collections can be found in a museum or library.

In 1966, an exciting discovery was made. Someone came across old papers on the shelf of a library in Madrid, Spain. The papers were part of Leonardo’s notebooks. In fact, they were the pages about science that had been organized by Leoni in the early 1600s.

Perhaps more of Leonardo’s notebooks are waiting to be found.
A horse statue, inspired by plans of Leonardo, is on display in Milan, Italy. The statue is 2 feet 7 m tall.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1452</td>
<td>Leonardo is born in Vinci on April 15</td>
</tr>
<tr>
<td>1457</td>
<td>Tax records list Leonardo as a dependent of his grandfather, Antonio.</td>
</tr>
<tr>
<td>1466</td>
<td>Leonardo arrives in Florence to apprentice with Andrea del Verrocchio.</td>
</tr>
<tr>
<td>1477</td>
<td>Leonardo leaves Andrea del Verrocchio’s studio to begin work on his own.</td>
</tr>
<tr>
<td>1478</td>
<td>Leonardo receives his first commission, an altarpiece.</td>
</tr>
<tr>
<td>1482</td>
<td>Leonardo moves to Milan as Ludovico Sforza’s court entertainer.</td>
</tr>
<tr>
<td>Year(s)</td>
<td>Event(s)</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>1469</td>
<td>Leonardo most likely painted the fish and dog in Andrea del Verrocchio’s <em>Tobias and the Angel</em>.</td>
</tr>
<tr>
<td>mid-1470s</td>
<td>Leonardo completes <em>The Annunciation</em>; his first work done entirely on his own.</td>
</tr>
<tr>
<td>1472</td>
<td>Leonardo becomes a member of the painters’ guild.</td>
</tr>
<tr>
<td>1483</td>
<td>Leonardo and two other artists receive a commission to paint <em>The Virgin of the Rocks</em>.</td>
</tr>
<tr>
<td>mid-1480s</td>
<td>Leonardo begins keeping notebooks for his ideas and sketches.</td>
</tr>
<tr>
<td>1489</td>
<td>Ludovico Sforza commissions Leonardo to create a statue of a horse and rider.</td>
</tr>
</tbody>
</table>
### Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1490</td>
<td><em>Il Paradiso</em>, with the stage set designed by Leonardo, is presented in honor of the marriage of the Duke of Milan’s nephew.</td>
</tr>
<tr>
<td>1495</td>
<td>Leonardo begins work on <em>The Last Supper</em>.</td>
</tr>
<tr>
<td>1502</td>
<td>Leonardo becomes the military engineer for Cesare Borgia in May.</td>
</tr>
<tr>
<td>1507</td>
<td>Leonardo becomes the court artist for King Louis XII of France.</td>
</tr>
<tr>
<td>1513</td>
<td>Leonardo moves to Rome and the summer home of the pope.</td>
</tr>
</tbody>
</table>
1503
Leonardo begins work on the *Mona Lisa*.

1504
Leonardo's father Ser Piero dies on July 9. Leonardo is not mentioned in the will.

1516
At King François I’s request, Leonardo moves to France as the court’s painter.

1519
Leonardo dies on May 2 in France.
Date of Birth
April 15, 1452

Place of Birth
Vinci, Italy

Date of Death
May 2, 1519

Place of Death
Amboise, France, in a home provided for him by the French King François I

Parents
Ser Piero da Vinci and Caterina, who did not marry as she was not considered suitable for Piero’s respected and educated family. Leonardo grew up in the country under the care of his grandfather, Antonio.

Education
As the child of unmarried parents, a formal education was not available to Leonardo. In approximately 1466, he was apprenticed to the artist Andrea del Verrocchio.

Marriage
Not married.

Children
No children.

Career Highlights
His paintings include The Annunciation, The Virgin of the Rocks, The Last Supper, and Mona Lisa. His scientific notebooks on many topics, including anatomy, flight, architecture, and war machines, have proved remarkable for his insight.
Residences
For a poor, uneducated man, Leonardo led a life filled with travels. He worked for dukes, kings, and even the pope. Leonardo’s apprenticeship and his commissions for Lorenzo de’ Medici occurred in Florence, where he lived for 16 years. He was invited to Milan as a court entertainer. Leonardo painted *The Virgin of the Rocks*. He was commissioned to paint *The Last Supper* in a Florence monastery. With his interest in engineering, he became Cesare Borgia’s military engineer and traveled throughout Italy for six months until Borgia’s death. In his sixties, Leonardo was given the use of the summer home of Pope Leo X in Rome. During this time, he most likely worked on what may have been his last painting, *St. John the Baptist*. By the fall of 1516, he journeyed to France at the request of the French king. Leonardo organized his notes and planned a palace for the king, but it is unlikely he painted. He died in France on May 2, 1519.

Conflicts
There was competition among artists for the favor of the art patrons in the major cities in order to obtain painting commissions. Leonardo considered Michelangelo (who was selected to paint the ceiling of the Sistine Chapel) to be a rival.

In order to perfect his drawing skills and the understanding of the body, Leonardo learned much about anatomy from the dissection of executed criminals. Dissection went against the laws of the Roman Catholic Church.

Quote
“...rely on that which is much greater and more worthy: — on experience.” —Leonardo da Vinci
Select Bibliography


Further Reading


Web Links

To learn more about Leonardo da Vinci, visit ABDO Publishing Company on the World Wide Web at www.abdopublishing.com. Web sites about Leonardo da Vinci are featured on our Book Links page. These links are routinely monitored and updated to provide the most current information available.

Places to Visit

You can view Leonardo’s work in the following museums and galleries:

Louvre Museum
Paris, France
33(0)1 40 20 53 17
www.louvre.fr/liv/musee/alaune.jsp?bmLocale=en
Mona Lisa, Adoration of the Magi, Drapery for a Seated Figure

Church and Dominican Convent of Santa Maria delle Grazie
Milan, Italy
whc.unesco.org/pg.cfm?cid=318id_site=93
The Last Supper

National Gallery of Art
4th and Constitution Avenue NW
Washington, D.C. 20565
202-737-4215
www.nga.gov
Study of a Madonna, Ginevra de’Benci, Sheet of Studies

National Gallery
Trafalgar Square
London, England
020 7747 2885
www.nationalgallery.org.uk
An Angel in Red with a Lute, The Virgin and Child, The Virgin of the Rocks
Glossary

altarpiece
   Painting used as decoration for a church altar.

anatomy
   Study of the human body, including muscles, bones, and nerves.

apprentice
   Young person who studies a trade or craft from a master.

beneficently
   Given or offered in a kindly manner.

botany
   A branch of biology related to plants.

cartoon
   A preliminary sketch or drawing for a painting.

city-state
   A self-governing city and its surrounding area.

codex
   Early type of book or collection of pages.

commission
   To hire someone to complete a job; a job done by request.

depict
   Represent by a drawing or a picture.

fresco
   Painting on a plaster surface.

gesso
   White, paste-like mixture used as a background for painting.

guild
   An association of people with similar professions.

landscape
   Drawing or painting that shows a natural scene.

Madonna
   Mary, the mother of Jesus Christ.
mineral
Natural substance found in the earth, such as iron. Minerals are used to create colors for paints.

monastery
A home for monks who take vows and belong to certain religious groups.

niche
A recess or opening in a wall.

notary
Professional who draws up contracts and keeps records.

patron
Person who supports the arts and artists.

perspective
The technique of drawing or painting objects on a flat surface so they look correct in terms of size and distance.

pope
The leader of the Roman Catholic Church.

Renaissance
Time of increased interest in the arts and science. Began in Italy in the 1300s and lasted approximately 300 years.

reproduction
A close copy of a drawing or painting.

spectacle
An entertainment event or display noted for its creativity and unusual display of theatrics.

tambourine
A small, handheld, one-sided drum with loose metal disks.

terra cotta
A type of baked clay; terra cotta figures were created from wet clay then baked until hard.
Chapter 1. A Gallant Spectacle


Chapter 2. Growing Up in Vinci


3. Ibid. 7.

Chapter 3. An Artist’s Training

2. Ibid. 319.

3. Ibid. 243.

Chapter 4. The Artist on His Own


3. Ibid. 127.

Chapter 5. Milan
2. Ibid.

3. Ibid.

4. Ibid.

5. Ibid.


8. Ibid.

**Chapter 6. The Notebooks**


3. Ibid. 248.


**Chapter 7. The Unsettled Years**


Source Notes Continued


Chapter 8. Villas and Veins


4. Ibid. 110.


Chapter 9. Leonardo in France


3. Ibid. 487.

4. Ibid. 288.

5. Ibid. 496.

6. Ibid. 499.
Chapter 10. Leonardo’s Legacy


Alexander VI, 63–64
apprentice, 22, 25–30, 64, 77
Aragon, Isabella of, 7, 68

Bible, 16
Bologna, Italy, 82–83
Borgia, Cesare, 63–64
Caprotti, Giacomo “Salai,” 53, 83, 86
Catholic Church, 18, 74
Cheradini, Lisa, 68
city-state, 12
Codex
Arundel, 92
Ashburnham, 92
Atlanticus, 92
Forster, 92
Institut de France, 92
Leicester, 55
Madrid Folios, 92
"On the Flight of Birds," 92
Trivulzianus, 92
Windsor Folios, 92
d’Amboise, Charles, 71, 78
d’Este, Isabella, 61–63
da Vinci, Antonio (grandfather), 15, 17
da Vinci, Antonio (half-brother), 36
da Vinci, Caterina, (mother), 16, 68
da Vinci, Francesco (uncle), 18
da Vinci, Piero (father), 16–17,
Dent, Charles, 94

Florence, Italy, 16–17, 24–26, 37, 61–64, 81
France, 48, 72, 83–86
Francois I, 82–85
French invasion, 48
fresco, 28, 64–67

Galileo, 89
Gates, Bill, 55
gesso, 28
Harvey, William, 89
Latin, II, 20
Leo X, 81, 83
Leonardo,
anatomy, study of, 72–75, 82
birth, 15
death, 86
education, 19–21. See also apprentice.
family. See da Vinci
flight, 54–56
inventions, 56–58, 79, 89
left-handedness, 17, 20–21
musician, 41–42
notebooks, 50–58, 64, 78, 82, 91–94
paintings. See under works, of Leonardo.
scientist, 75, 88–89
war machines, 40–41
Leoni, Pompeo, 93

Literary Works of Leonardo da
Vinci, The, 94
Louis XII, 48, 70–72
Louvre, 90–91
Mantua, Italy, 61
Medici, Cosimo de’, 29
Medici, Lorenzo de’, 26, 37–38, 42
Melzi, Francesco, 86, 91–92
Melzi, Orazio, 92
Michelangelo, 62, 65–67
Milan, Italy, 40–43, 48, 70–72, 77
mirror writing, 17
Mount Albano, 15
mural, 28, 46–48
National Gallery, 93
Newton, Isaac, 89
notary, 16–17, 36
oil, See under paints.
Ottoman Empire, 64
painter’s guild, 33, 36
paints
oil, 18–19, 27
tempera, 27, 48
paper, 27–28
perspective, 27
Pisa, Italy, 63
plague, 42
Renaissance, 12, 18
artists of, 28, 33, 38
Richter, Jean Paul, 94
Sforza family, 78
Sforza, Francesco, 45
Sforza, Gian Galeazzo, 7
Sforza, Ludovico, 6–7, 40–42, 44–46
Swiss attack, 78
Vasari, Giorgio, 44, 64, 86
Venice, 61, 63
Verrocchio, Andrea del, 25–37
Baptism of Christ, The, 44
Christ and St. Thomas, 29
David, 29
terra cotta angels, 29, 35
Tobias and the Angel, 29–30
Villa Belvedere, 81
Vinci, Italy, 15
works, of Leonardo
Annunciation, The, 32–33, 35
Battle of Anghiari, 65–67
Ginevra de’ Benci, 34–35
Il Paradiso, 7–9
Last Supper, The, 46–48, 90
Mona Lisa, 67–69, 90–91
St. John the Baptist, 80–81
Virgin of the Rocks, The, 43–44, 93
Vitruvian Man, 70, 72
M.C. Hall has 13 years of experience as a teacher and reading specialist in New York state. After moving to Iowa, she worked as a writer and editor for an educational publisher and as a consultant with the state education department. She has also worked as executive editor for a children’s toy/book company in New Hampshire. For the past ten years, M.C. Hall has been a freelancer and has written more than 80 children’s books, ranging from biographies to fairy tales. She now lives in Massachusetts.

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