AGES 8+

LEONARDO DA VINCI

Genius is Timeless

Armored Car

DEVELOPING 500 YEARS OF DREAMS

DA VINCI

Instruction manual

Contents

Leonardo Da Vinci

(April 15, 1452 - May 2, 1519)

"Iron rusts from disuse; stagnant water loses its purity and in cold weather becomes frozen; even so does inaction sap the vigor of the mind."

Leonardo

Leonardo da Vinci *was born April 15, 1452 in Vinci, Italy. Da Vinci was an artist, scientist, mathematician, engineer, inventor, anatomist, sculptor, architect, botanist, musician and writer. He has often been described as a perfect example of a Renaissance man, a man whose unquenchable curiosity was equaled only by his powers of invention and observation. Da Vinci is widely considered to be one of the greatest painters of all time and perhaps the most diversely talented person to have ever lived.*

At an early age, Da Vinci's talent for drawing became evident, and his father apprenticed his young son to a noted period artist, Andrea del Verrocchio. Through the coming years, the young Leonardo learned much from his mentor and at the age of thirty, Da Vinci left Florence and settled in Milan and established a workshop of his own. During the following years, he earned his living painting commissioned pieces. He soon came to the conclusion that it was not possible for him to earn steady income doing this and began his search for employment. He began by writing a letter to the Duchy of Milan, Duke Ludovico Sforza, known by the nickname, the Moor. In this correspondence, Da Vinci stated that he had studied machines of war and had come up with improvements that would

strengthen the Moor's position in battles. The letter hinted at inventions that included portable lightweight bridges and improved designs for bombards, mortars, catapults, covered assault vehicles and weapons. The Moor eventually became Da Vinci's patron and kept him busy with everything from designing a heating system to painting portraits, to overseeing production of cannons and even decorating the vaulted ceilings in his castle.

It was during this time that Da Vinci began writing and drawing in his journals. These volumes became repositories of the outflow of Leonardo's gifted mind. He was a voracious student of the universe and his observations led to magnificent plans and concepts. Da Vinci's notebooks consist of more than 20,000 sketches, copious notes and detailed drawings. Some of his conceptual designs led to the greatest inventions of his day, while others came to fruition hundreds of years after his initial concepts were penned, simply because the machinery needed to build and power them were not yet invented. Leonardo's notebooks clearly illustrate his genius of not only improving upon existing inventions, but also conceiving a myriad of new ideas and designs.

Ultimately, the Moor was captured by the French and Da Vinci left Milan in search of a new patron. He traveled through Italy for more than a decade, working for several Dukes and rulers, including Cesare Borgia, a General intent on conquering central Italy. Leonardo traveled with Borgia as a military engineer, designing weapons, fortresses and artillery, but became disillusioned and quickly left his service with the General. It seems that despite Da Vinci's design for artillery and weaponry, he was actually a pacifist and detested war and its destruction.

Da Vinci later took positions with King Louis XII and Pope Leo X and ultimately with the King of France, Francis I. It was the King who offered Da Vinci the title, Premier Painter and Engineer and Architect of the King. Francis I valued Da Vinci's great mind and his sole function was to engage in conversations about Renaissance culture and art with the benevolent royal.

ARTISTIC MASTERPIECES OF LEONARDO DA VINCI

Virtruvian Man (circa 1487)

It is important to remember that Da Vinci is not only and great inventor, but is considered to be one of the most acclaimed artists to ever have lived, creating such masterpieces as The Last Supper (c.1498) and the Mona Lisa (c.1503). Leonardo's drawing of the Vitruvian Man is also regarded as a masterpiece. Unfortunately, only a small number of Da Vinci's paintings have survived. Leonardo experimented with new techniques, most of which did not yield long-lasting results. The master painter was also somewhat of a perfectionist with fastidious attention to detail. It is believed that when painting the Mona Lisa, the artist spent ten years perfecting the lips of this masterpiece.

The Mona Lisa (circa 1503)

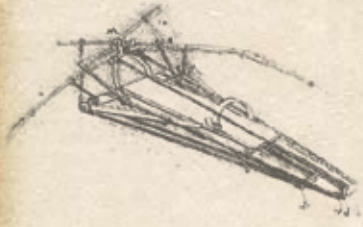
The Last Supper (circa 1498)

Da Vinci's Notebooks

Da Vinci's notebooks are now more than 500 years old. They are not bound the way a typical book would be today, but rather comprised of loose sheets of paper gathered into collections and wrapped with fabric. Paper was scarce in Da Vinci's time, so he used every available space in a page for drawings, observations, even recipes and shopping lists, making them somewhat difficult to interpret. Adding to the difficulty in deciphering his works was the fact that Da Vinci's scripted notes were written backwards, or in a mirror image, and read from right to left. His reason for this remains a mystery, but it is thought that Leonardo's theories sometimes went against church teachings and his secret writing could have been a way to avoid scrutiny. Da Vinci also might have feared that someone would steal his designs and publish them under their own name. Ironically, Da Vinci addressed an imaginary readership in the margins of his notebooks urging the reader to make sure his work was printed into a proper book. It is presumed that he meant for the notebooks to be published after his death.

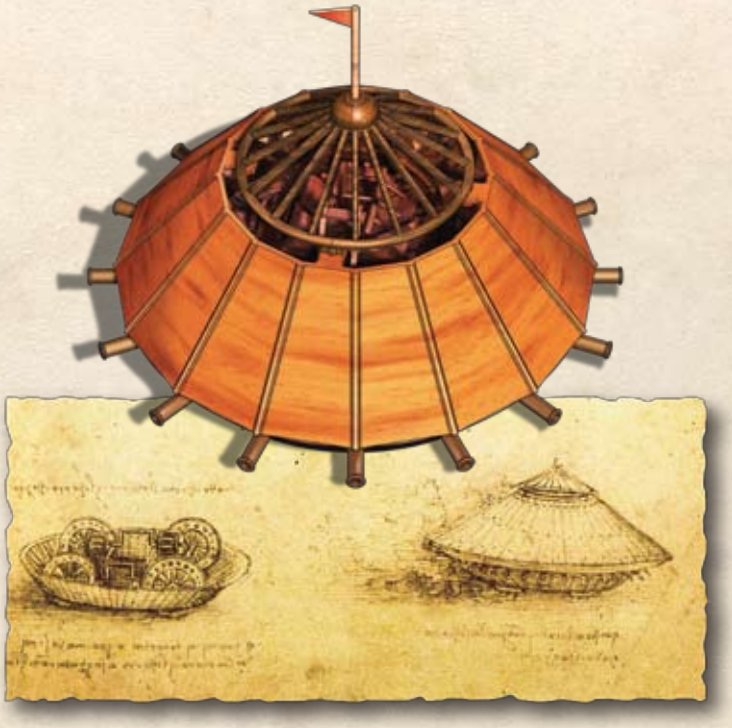
Leonardo Da Vinci

Several common themes recur in the now fragile notebooks: Nature, Technology (including gears, cogwheels, screws and pulleys), aviation and vision, to name a few. Upon the death of Leonardo Da Vinci, the notebooks were given to his long-time friend, Count Francesco Melzi. Melzi did not fully comprehend the value of the information and published only a portion of the volumes. He placed the notebooks in his home where they were viewed by guests who sometimes took pages with them as souvenirs.After Melzi's death, an additional 13 Da Vinci notebooks disappeared and soon pages were scattered across Europe. Da Vinci's notebook extracts were published in 1883 and about half of them have not yet resurfaced so far. It is easy to imagine that had the notebooks been published earlier, the history of science might have been completely changed.



In his drawings, Leonardo strived for saper vedere or "knowing how to see." Da Vinci's illustrations are unparalleled and some experts believe that no one has since been better.

Da Vinci's Design: Armored Car



The Armored Car is one of the most famous of Da Vinci's projects. In a letter to the Duke of Milan, Da Vinci boasted "I can make armored cars, safe and unassailable, which will enter the close ranks of the enemy with their artillery, and no company of soldiers is so great that they will not break through them. And behind these the infantry will be able to follow quite unharmed and without any opposition."

Reading Leonardo's letter, it would be hard to imagine that he was a man of peace who loved nature and all living things. In fact, this gentle soul loved animals so much that not only did he eventually become a vegetarian, but he was also known to buy caged birds in the market, just to set them free.

Perhaps he was enticed by the challenge of making machines of war or maybe it was simply a way to ingratiate himself to Rulers who paid his salary. Whatever the reason, Da Vinci set about to draw plans for an improved armored car in 1485. The vehicle was to be powered by four men situated inside the tank. These tank operators would turn internal gears, which in turn would move the wheels of the tank forward. The armored car was also designed with light cannons arranged on a circular platform, providing a firing range of 360 degrees. The platform was capped with a conical cover with a sighting turret at the top. The design, however, contained some flaws. Even with several modifications to the original plans Da Vinci continued to be faced with a number of unresolved problems and eventually abandoned the project.

Upon studying Da Vinci's plans today, his instructions were clear, but it seems that Leonardo had intentionally placed the gears of the design in reverse order, which makes the tank unworkable. Scholars believe that he placed this misinformation in his design as a form of security to prevent someone from stealing his design and using the tank irresponsibly.

The Armored Car Was A Precursor To The Military Tank

A tank is an armored vehicle designed for front-line combat. Tanks combine mobility and tactical offensive and defensive capabilities. They are fitted with firepower, normally provided by a large-caliber main gun in a rotating turret, along with secondary machine guns. Heavy armor and all-terrain mobility provide protection for the tank and its crew.

Today, tanks seldom operate alone, and are organized into armored units, which involve the support of infantry, who may accompany the tanks in armored personnel carriers or infantry fighting vehicles. Tanks are often accompanied by reconnaissance or ground-attack aircraft. Due to its formidable capabilities and versatility, the battle tank is generally considered a key component of modern armies.

The Evolution Of The Military Tank

Fifteenth Century

- *Leonard Da Vinci draws plans for the Armored Car, a moveable war machine designed to protect its crew while firing weapons at the enemy at close range.*

Early Models

- *In 1770, Richard Edgeworth of Great Britain designed the first caterpillar track, a continuous metal belt that enabled vehicles to move more easily over uneven terrain. During the Crimean War, the English, on the battlefield, used a limited number of steam-driven tractors with caterpillar tracks.*

- *In 1899, British engineer, Frederick Simms, designed an internal combustion vehicle with revolving turrets with two guns and a bulletproof shell.*

World War I

- *In 1915, a prototype was created in Britain called "Little Willie" for The Royal Navy.*

- *Colonel Ernest Swinton organized a successful test of the Killen-Strait Armoured Tractor at the start of World War I.*

World War II

- *Strategists saw new roles for tanks. Including the ability to destroy enemy tanks and wanted more specifically developed guns tailored to these missions. Anti-tank gun designs were modified to fit tanks.*

- *Communication equipment in tanks, armor guns and targeting, and crew comfort were improved.*

After WW II

- *Communication equipment in tanks, armor guns and targeting, and crew comfort continued to improve.*

Current Day Tanks

- *The major American heavy tank in the 1990-1991 Gulf War, the M-1A1 Abrams used armor plating that was more than twice as dense as steel. The stabilized gun mount of the M-1A1 and its infrared vision made it effective in dust, smoke and darkness, making it an asset in desert conditions.*

M1A2 with TUSK (Tank Urban Survival Kit) for urban battle.

Glossary Words

Continuous Track *– one or more steel sprockets rotated by the engine to move a track made up of hundreds of metal links. Tracked vehicles have better mobility over rough terrain and smooth out bumps and glide over small obstacles.*

Hatch *– a covered and armored entrance to a tank for the crew.*

Hull *– the bottom, armored body portion of a tank containing the engine and transmission. The hull's job is to transport the turret, from place to place.*

Main Gun (or Tank Gun) *– Large caliber, high velocity guns that serves as the main armament of a tank. The guns provide accuracy, and rapid fire and are as compact as possible, to allow mounting in the cramped confines of an armored turret.*

Periscope *– optical instrument used to enable an observer to see his surroundings while remaining in the tank.*

Turret *– a rotating weapon platform that allows machineguns and cannons to be aimed and fired in multiple directions.*

Fun Facts

How The Tank Got Its Name

The name "tank" got its name from a diversionary tactic. The Allied forces built the first tanks in secrecy because they wanted to catch the Germans off guard. In order to conceal their plan, they told the workers building the weapons that the machines would be used to transport water on the battlefield. They shipped the machines in crates marked "tank," and the name stuck.

Armored Car Design Borrowed From Nature

Da Vinci took his inspiration from the common turtle. His tortoise-shaped vehicle had a domed top to deflect enemy projectiles.

Components

Ⓐ

Ⓑ x 2

Ⓒ x 2

Ⓓ

Ⓔ

Ⓕ x 16

Ⓖ x 2

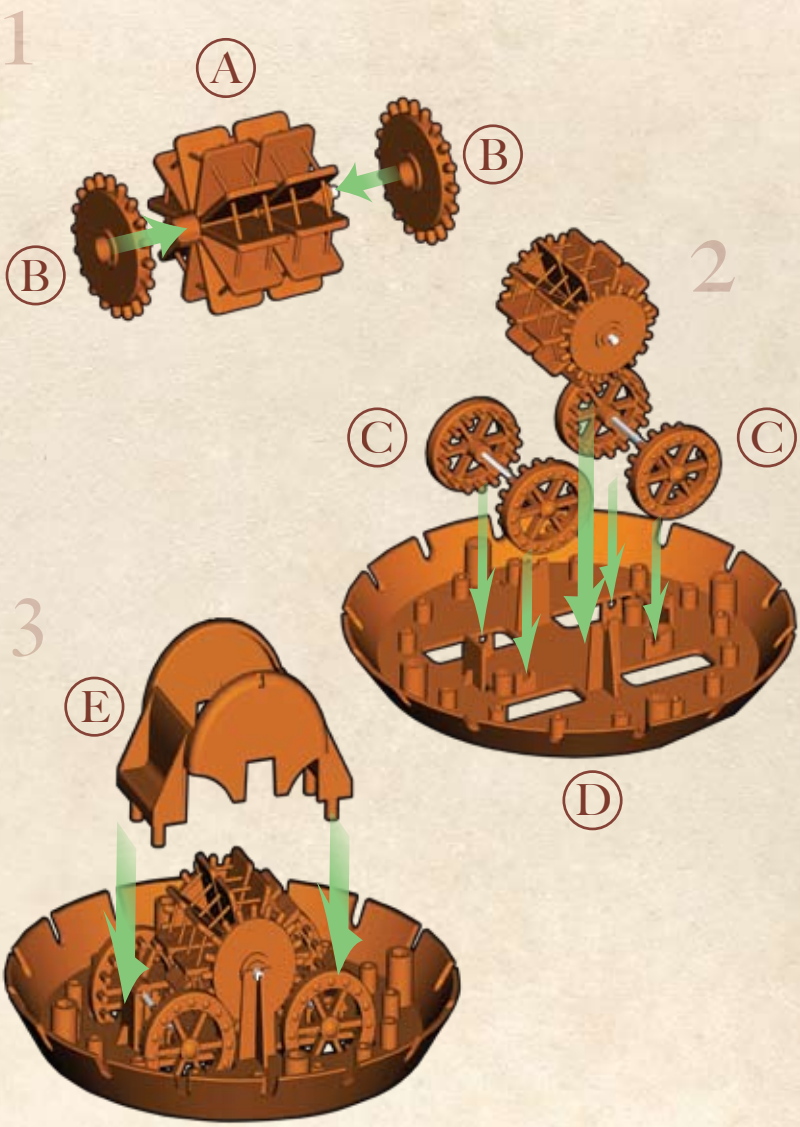
Ⓗ

Ⓘ

Ⓙ

Ⓚ

How to Assemble



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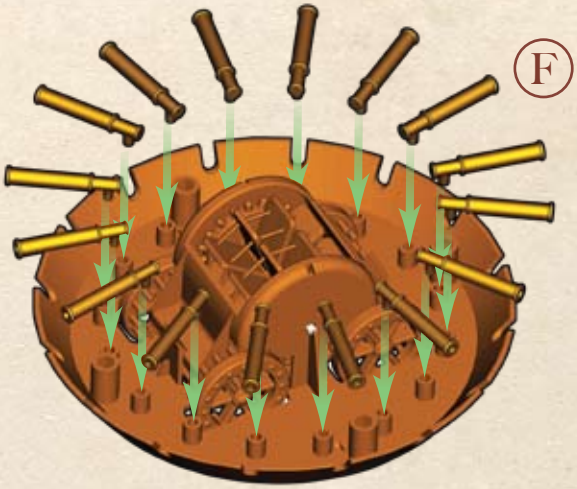

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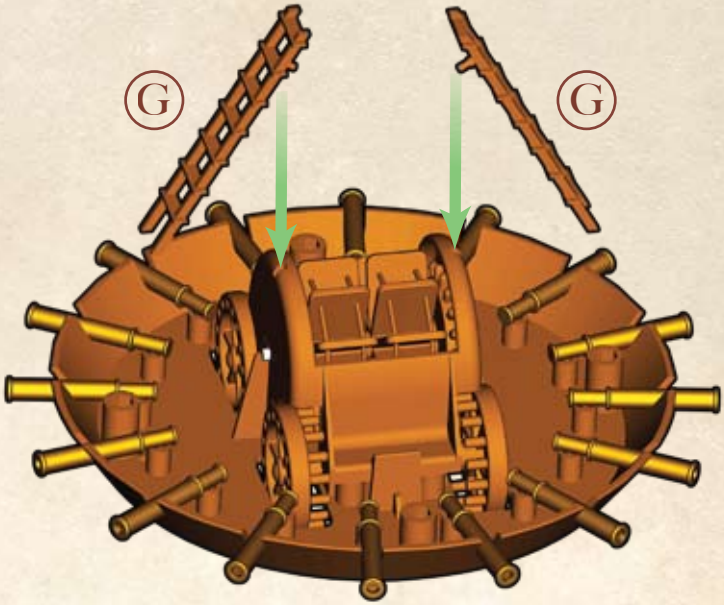

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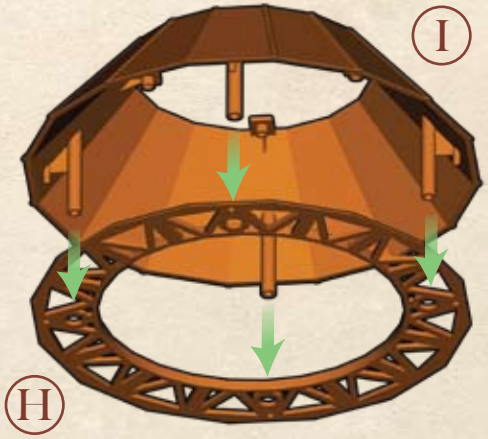

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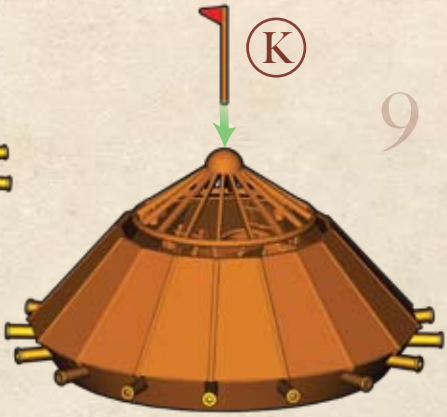


Leonardo Da Vinci

The scientific genius of Leonardo Da Vinci is brought to life through articulated models offered by Edu-Science. The inventions that inspired these snap-together replicas are taken from the pages of Da Vinci's priceless and awe-inspiring notebooks.

Edu-Science Da Vinci Series Kits

DV001

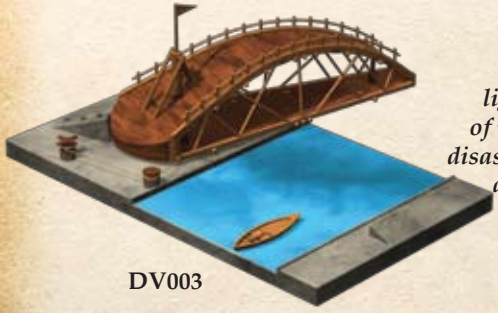
Mechanical Drum

Leonardo da Vinci's mechanical drum was designed as a cart equipped with an amply sized drum. When pulled by its handle, the gears turn the two lateral drums, which are fitted with pegs. The pegs move a total of ten drumsticks that cause them to beat the large drum.

Aerial Screw

The Aerial Screw design is a precursor of the modern day helicopter. The drawing of Da Vinci's concept illustrated the compression of air that was intended to lift the device off the ground.

DV002



DV003

Swing Bridge

The Swing Bridge was a portable, lightweight bridge intended to span a body of water for armies to cross, and then quickly disassemble in order to tow away. Equipped with a rope and wheels, the lightweight bridge was designed for easy transport.

Printing Press

Leonardo da Vinci studied the Guttenberg printing press and finely-tuned it for greater efficiency. In his design, he used a hand press with an automatic system that moved the type-saddle forward and back along a tilted surface, making printing faster and easier.

DV005

DV006

Multi-barreled Canon

The 12-barreled gun carriage was developed to give the traditional canon additional firepower and was a potentially effective weapon against a line of advancing troops.

Armored Car

A precursor to the modern-day tank, the armored car was capable of multi-directional movement and was equipped with cannons arranged in a 360-degree firing range around its circumference.

DV007

Leonardo Da Vinci

DV008

Paddleboat

In Da Vinci's time, nautical expedition was the most expedient method of communicating with the world and his design for a boat with large wheel-shaped paddles that would propel it through water offered a faster and easier method of water transportation.

Self-Propelled Cart

Da Vinci's self-propelled cart was the first to be capable of moving without being pushed or pulled manually. This precursor to the automobile was one of the many inventions that Leonardo created dealing with locomotion and transportation.

DV009

DV010

Catapult

Improvements were made to the age-old military launching device called a catapult. The new design employed a hand-crank that caused tension on the throw arm. The spring design produced a large amount of energy in order to propel stone projectiles or incendiary materials over great distances.

Bombard

This improved cannon was designed to include projectiles that contained a quantity of mini gunpowder shots packed into petal-shaped iron pieces that formed a ball. The device exploded into fragments that had greater range and impact than a single cannonball.

DV011

Notes

Notes

WARNING: CHOKING HAZARD-
Small parts. Not for children under 3 years.

P38-DV007-81001000 Printed in China