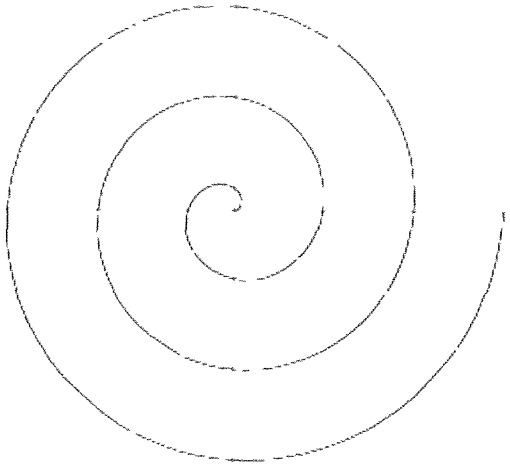
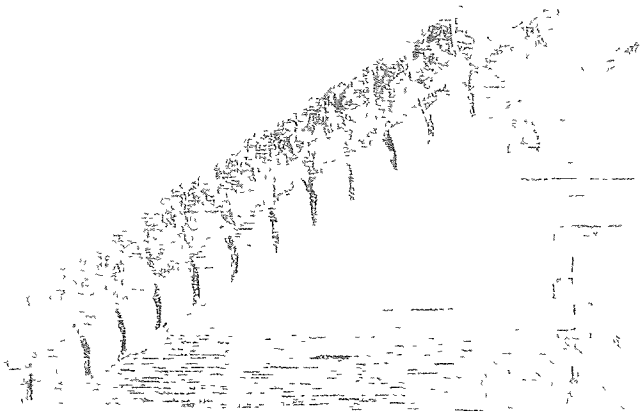




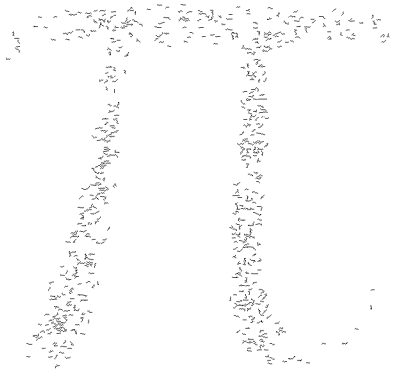
Archimedes: The Greatest Mathematician and Scientist in History

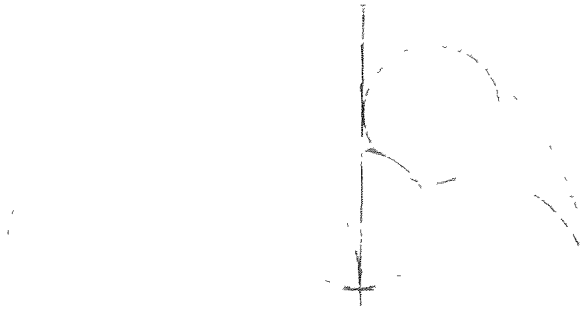
Alex Ho

Period 4

Ms. Chapman

2014-2015





Dear Reader,

Thousands of years ago in Ancient Greece, there lived many great mathematicians and scientists who have revolutionized and impacted our world today. One of these great men was Archimedes Archimedes is well known for his contributions to modern day algebra and geometry He also created many great inventions that are still used today.

I chose Archimedes as my topic because he was a brilliant inventor and mathematician and someone I greatly admire. I have always been interested in engineering and creating new things, and mathematics has been my strong suit Archimedes seemed to be an obvious choice for me Even if you aren't familiar with the name Archimedes, you should be acquainted with many things associated with him, such as the Archimedes Principle, which explains why giant ships are able to float despite being made of metal. His works are also commonly seen in daily life, like his explanation of how levers and pulleys work which helps us today in such things as a construction crane or even a child's seesaw

Researching Archimedes has showed me many things First, I learned how much one can achieve with dedication. Archimedes was very focused on his work throughout his life, and as a result, is renowned for being a father of mathematics It has also shown me the advances in technology our world has witnessed over the last few thousand years, but also how much has remained the same Although we may have new discoveries and fancy gadgets, the principles that mandate these phenomena have been constant throughout history And lastly, my research has shown me that new and groundbreaking discoveries don't necessarily need to be complex solutions, but that they may be found in simple, daily things

While reading these pieces, readers should keep in mind that Archimedes was born *over two thousand years ago* Remember this when reading about his discoveries and inventions to get a sense of how far ahead of his time Archimedes really was when he achieved these feats.

The Life and Work of Archimedes

Archimedes was an Ancient Greek mathematician and inventor who was born in Syracuse, Sicily around 295 B.C. and died around 211 B.C. He is known as one of the greatest scientists in history. As Heather Hasan said, "Archimedes also began the sciences of mechanics and hydrostatics, and he discovered the laws of buoyancy and specific gravity. With these, Archimedes set the world on a course that has led to feats of science we have seen in recent years." Several aspects of Archimedes' personal life allowed him to devote himself fully to his work, and this dedication led to several advances in math and science as well as many inventions which continue to impact us today.

Several important people as well as his personal circumstances contributed to Archimedes' success as a mathematician and scientist. His father, Pheidias, was a well-known astronomer and mathematician. Having been born into the upper class, Archimedes was given a strong education in the field of mathematics. He was close friends with Conon of Samos and Eratosthenes of Cyrene, gifted mathematicians and astronomers of that time, and he often discussed his findings with them before they were published. Being a part of the nobility in Syracuse, Archimedes was very close, and possibly even related, to Hieron II, the king of Syracuse, and his son, Gelon. King Hieron had great respect for Archimedes, and he often sought Archimedes' help when he faced a difficult situation. In solving the king's most challenging problems, Archimedes was led to some of his greatest discoveries.

Most of Archimedes' work and many of his discoveries were made after his time in Alexandria, Egypt. It was there that he studied the works a Euclid, a great mathematician and teacher. Returning to Syracuse, Archimedes became singularly focused on his work. "After his return to Syracuse he lived a life entirely devoted to mathematical research." (Heath, XVI). Although the exact details are not certain, Archimedes was also said to have been doing math up to his death. "Others say that the Roman ran up to him with a drawn sword offering to kill him; and when Archimedes saw him, he begged him earnestly to wait a short time in order that he might not leave his problem incomplete and unsolved, but the other took no notice and killed him." (Heath, XVIII).

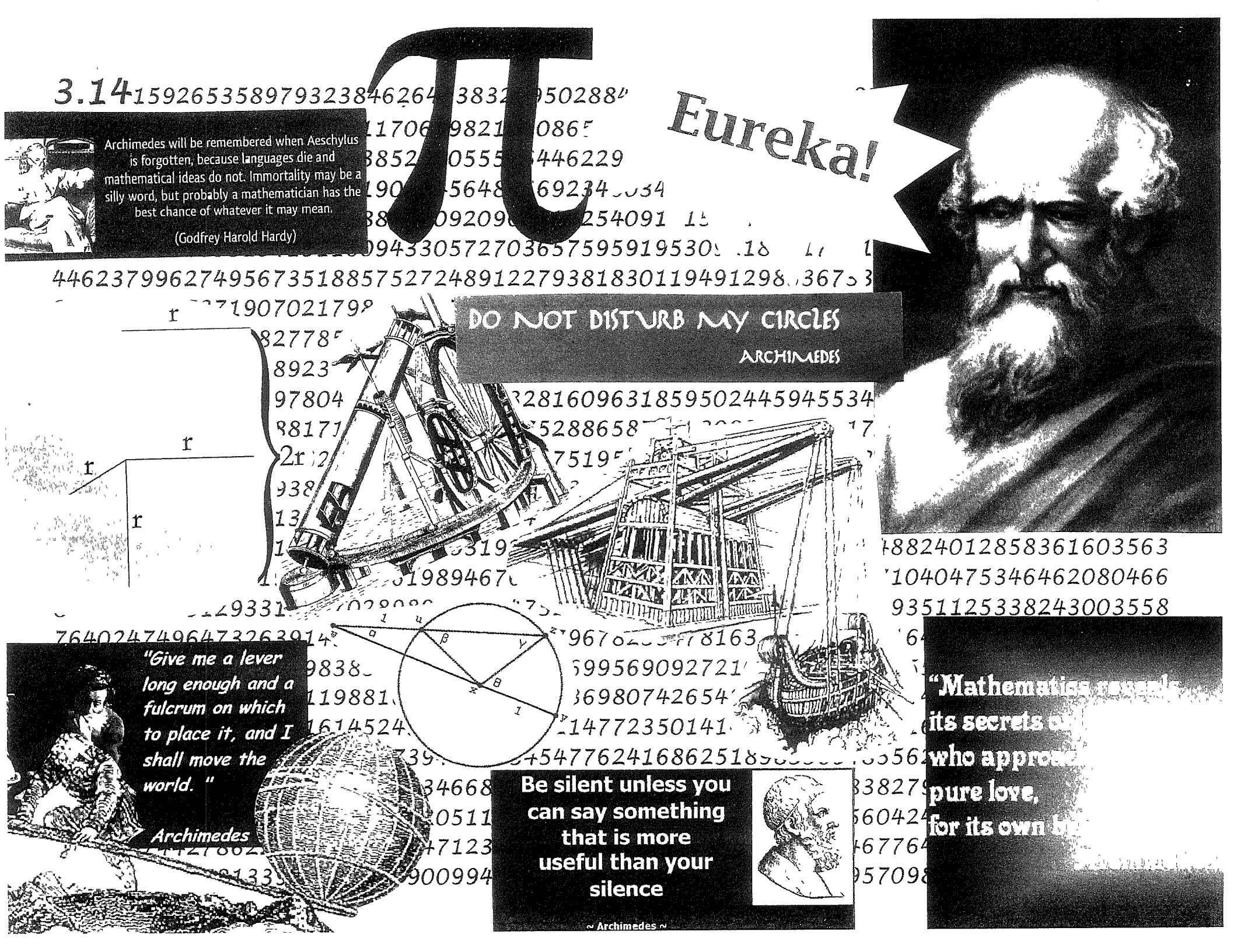
Archimedes' commitment to his work led to many discoveries and inventions which continue to make an impact on us today. The Archimedes Screw, one of his most important inventions, is a device that allows one to move water more efficiently. In today's word, it is used in many developing countries to retrieve water from wells and used in the Netherlands to drain unwanted water from the surface of the land. Motorboat and airplane propellers are quite similar to the Archimedes Screw. One of Archimedes' most momentous discoveries was the value of pi, or the ratio of a circle's circumference to its diameter. Pi remains a fundamental part of geometry. Archimedes also explained basic principles of mechanics and designed the compound pulley and the lever and fulcrum. These were novel means of moving a large weight with a small amount of force. Compound pulleys and fulcrum and levers are used in everyday items today, especially in construction and machines. Archimedes is probably most celebrated for discovering the hydrostatic principle, also known as Archimedes' Principle. This principle states that the upward buoyant force that is exerted on a body submerged in a fluid is equal to the weight of the fluid that the body displaces. This discovery became the foundation of the science of hydrostatics.

The circumstances of Archimedes' personal life allowed him to concentrate solely on his work as a mathematician and scientist and gave him the means to make his findings well known. As a result, many of his discoveries and inventions have had a great impact in several modern

fields Through his dedicated studies, we understand his hydrostatic principle, Archimedes' Principle, and the workings of compound pulleys and levers and fulcrum These are just a few examples of the many contributions he has made to the modern fields of mathematics and science Archimedes' inventions continue to help many people around the world There is no doubt that Archimedes was one of history's greatest scientists who spent his life dedicated to his work

The Life and Genius of Archimedes

Archimedes of Syracuse, known now as one of the greatest mathematicians and inventors of history, little did you know of your brilliance and far-reaching influence. As a young boy in ancient Greece, mathematics was simply part of your everyday life as the son of an astronomer. It permeated your being and became a part of your soul. As a student and a young man of 18, studying at the great library of Alexandria, you continued to feed your mind the knowledge it craved, unaware that great discoveries and inventions were waiting to surface. So great was your passion for mathematics that you would neglect your bodily needs, forgetting to eat and sleep. So overwhelming were your ideas that you scribbled them anywhere and everywhere, notes, drawings, and equations covering all surfaces. A stick used to draw in the ground and your finger used to trace in the olive oil upon your skin, serving as your ever present assistants. From your great mind came so many founding theories of mathematics, essential to modern day geometry, algebra, and calculus. The value of pi, approximating square roots, calculating areas and volumes, describing very large numbers, proving the relationship between the volume of a sphere and a circumscribed cylinder. All genius. All thousands of years before its time. But your very busy mind was not content with discoveries only in mathematics, but reached beyond to include many equally ingenious inventions. Called upon by your king and your community, you served your country as valiantly as a soldier in the battlefield. From the Archimedes Claw to protect Greece from the enemy to the Archimedes Screw to aid the farmers in feeding the nation, you were always focused on more improvements, more inventions. Even facing death your devotion was to your work, admonishing a Roman soldier, "Don't disturb my circles," as you were slayed. Thus, one of the greatest minds in history was put to sleep.


3.14
π
Eureka!
Archimedes will be remembered when Aeschylus is forgotten, because languages die and mathematical ideas do not. Immortality may be a silly word, but probably a mathematician has the best chance of whatever it may mean.
(Godfrey Harold Hardy)
DO NOT DISTURB MY CIRCLES
ARCHIMEDES
r
r
r
2r
"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world."
Archimedes
Be silent unless you can say something that is more useful than your silence
~ Archimedes ~
"Mathematics reveals its secrets
who approa
pure love,
for its own

Archimedes and the Crown

King Hieron II of Syracuse was a great king in the time of Ancient Greece, and always demanded the best of everything. Thus, he frequently adorned himself with elaborate accessories and wardrobes to reflect the magnificence of his kingdom. One day, after receiving a crown he had the goldsmith make for him, the king, being accustomed to only the finest things, had a feeling that the crown was not all that it appeared to be. He held the crown and his keen senses told him the crown was not made of pure gold. He had been cheated, and the goldsmith had replaced some of the gold with silver!

Although Hieron believed that he had been deceived, he did not want to damage his newly forged crown. He challenged all of the greatest minds across Greece to examine the crown and find a way to prove his suspicions. He offered a great reward to anyone who could expose the goldsmith as a cheat and a criminal. One of these great minds was Archimedes of Syracuse, son of an astronomer and already friendly with both the king and his son as he had helped them many times before.

Following many weeks of repeated examination, most of the great scholars who attempted to solve this problem eventually concluded it to be impossible and gave up. Archimedes was not intimidated and persisted in his efforts. After a long day of working, Archimedes decided to relax and take a well-deserved bath. Stepping into the bathtub which was nearly full of water, he noticed that some of the water spilled out of the tub. Then it all suddenly became clear to him, and he jumped out of the tub and ran into the streets shouting excitedly, "Eureka, eureka!" or "I have found it!" in Ancient Greek.

After calming himself, he made two masses that were the same weight as the crown, but one was made of silver and the other of gold. He then filled a large container with water to the very top and placed the silver piece in. The amount of water that spilled out of the container was the same volume of the silver placed in. Next, taking out the silver piece, he measured the amount of water lost when the gold piece was place into it. Because gold is denser, it displaced less water than silver. After

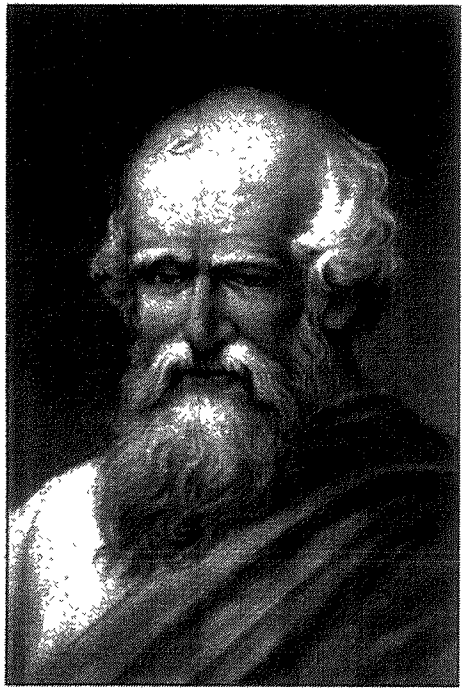
taking careful measurements, he placed the crown in the same container full of water.

Doing this, he found that the crown displaced more water than the gold piece of equal weight. This meant that there was silver as well as gold making up the crown, thus revealing the thief! Archimedes was greatly praised and thanked by King Hieron for solving this problem. He was then regarded as one of the most respected mathematicians and scientists of his time, and later proved to be one of the greatest minds in history.

Greek Times

no. 218,078 THE WORLDS OLDEST NEWSPAPER - since 300 B.C.E. -

ARCHIMEDES DOES IT AGAIN!



Philo of Byzantium - 260 B.C.E

Once again Archimedes of Syracuse, the well known mathematician, has come up with another brilliant invention.

Upon his return from Egypt, Archimedes soon revealed his latest creation, what he calls the Archimedes Screw. This new contraption is able to move water as easily as cranking a shaft.

One may ask, "How does this work?" Well although revolutionary, it is quite simple. It consists of a large screw inside of a hollow pipe. As the shaft turns, it picks up water and the water slides up the tube until it pours out and reaches the top.

We sent a letter to one of Archimedes' close friends Conon of Samos, who is also a mathematician, and asked what he thought of this new invention. He replied saying,

"This new device is ingenious! I am jealous that I did not think of this myself! But I digress I believe that this could greatly impact our society. It could improve on ways to transport water to irrigate our crops, creating even more surplus for trade! Or even draining out flooded fields after storms! The possibilities are endless. All in all, I am very impressed."

At the rate that he is going right now, Archimedes could easily become one of the greatest scientists in history. What will he discover next? Archimedes is truly one of the greatest scientists of our time

Notes Page

Recurring themes and relationships throughout this project include Archimedes' many discoveries and inventions resulting from his genius, as well as Archimedes' relationship to King Hieron and how it influenced his work Throughout the different pieces of this project, examples of Archimedes' discoveries in mathematics and science and his many inventions are included. His discoveries in math are shown by the use of pi, volume, and other aspects of geometry, such as the pi symbol on the cover page and in the background of the collage, the image depicting how one would find the volume of a sphere, and Archimedes' twin circles on the cover page as well The use of science is shown by the repeating use of and reference to the Archimedes screw in the title page, essay, prose poem, and as the main topic of the article. Archimedes' Principle is also another use of his knowledge of science as shown in the essay and myth. The sum of his work (pun intended) led to him being recognized as one of the greatest mathematicians and scientists of his time and in history that has made its impacts on us today

Archimedes' status as a member of nobility and his friendly relationship with King Hieron allowed him to focus exclusively on his work and made his discoveries well known This influence is explored in the expository essay, prose poem, the myth, and images of The Claw in the collage. King Hieron called upon Archimedes to solve many problems, leading to some of his greatest discoveries and inventions. As his patron, King Hieron was to make Archimedes' work widely known.