Archimedes

ALSO LISTED IN

Mathematicians, Physicists

FAMOUS AS

Mathematician, Engineer, Inventor, Physicist

NATIONALITY

Greek

BORN ON

287 BC

BORN IN

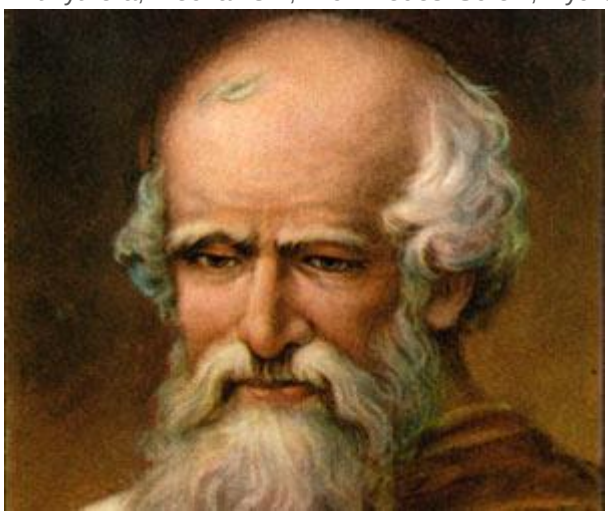
Syracuse

FATHER

Phidias

DISCOVERIES / INVENTIONS

Antikythera, Mechanism, Archimedes' Screw, Hydrostatics, Levers, Infinitesimals



Archimedes of Syracuse was an outstanding Greek mathematician, inventor, physicist, engineer and also an astronomer. Although not much is known about his life, he is considered as one of the most eminent scientists in classical antiquity. He established strong foundations in the field of physics, particularly in statics, hydrostatics and explained the principle of the lever. In his lifetime, he made many incredible inventions such as designing innovative machines, including screw pumps and siege machines, After intensive experiments, it is concluded that the machines designed by Archimedes are capable of lifting attacking ships out of the water and even setting ships on fire using an array of mirrors. Undoubtedly, Archimedes is considered the greatest scientist and mathematician of ancient times. He applied the ‘method of exhaustion’ in calculating the area under the arc of a parabola with the summation of an endless series and gave a marvelously precise approximation of pi, the symbol. He also identified the spiral that bears his name, designed formulae for the volumes of surfaces of revolution and also invented a technique for expressing extremely large numbers.

Archimedes was born in c. 287 BC in the seaport city of Syracuse, Sicily, which was a self-governing colony in Magna Graecia. His birth date is based on the calculations done by the Byzantine Greek historian John Tzetzes who concluded that Archimedes lived for around 75 years. In ‘The Sand Reckoner’, his father’s name is mentioned as ‘Phidias’, who was an astronomer, about whom nothing much is known. Plutarch marked in his ‘Parallel Lives’ that

Archimedes was related to King Hiero II, the ruler of Syracuse. However, many aspects of Archimedes are still mysterious. For instance, whether he ever married or not or whether he had children are details that aren't available at all. According to the information available, it is supposed that during his youth, Archimedes may have studied in Alexandria, Egypt, where Conon of Samos and Eratosthenes of Cyrene were his classmates. Archimedes had also referred to Conon of Samos as his friend and, on the other hand, two of his works viz., the Cattle Problem and the Method of Mechanical Theorems have introductions focused on Eratosthenes.

Famous Discoveries And Inventions

Archimedes' Principle

The most popular tale about Archimedes is regarding how he discovered a method for calculating the volume of objects with irregular shape. According to Vitruvius, a crown for a temple had been made for King Hiero II, who had supplied the pure gold to be used and Archimedes was asked to verify whether any silver had been used by the deceitful goldsmith. Archimedes was expected to solve the problem without damaging the crown and thus the option of melting it down into a regular shape was ruled out. One day, while taking a bath, he discerned that the level of the water in the tub increased as he got in, and comprehended that this effect could be used to determine the volume of the crown. As water is incompressible practically, so the crown after submerging would displace an amount of water equal to its own density and it would be possible to calculate the density of the crown if mass of the crown was divided by the volume of water displaced. Archimedes was so excited that he ran on the streets naked (he forgot to dress up), crying out 'Eureka!' meaning 'I have found it!' The test was conducted successfully, concluding that silver had certainly been mixed with the gold.

Archimedes' Screw

Archimedes analyzed the requirements in his home city of Syracuse and tried to make inventions useful for the people at large. The Greek writer Athenaeus of Naucratis had mentioned how King Hiero II instructed Archimedes to devise a gigantic ship, the 'Syracusia', which could be used to travel lavishly with supplies as well as can double up as a naval warship. Thus, Syracusia is known to be the largest ship built in olden days. Athenaeus had claimed that the ship was competent of carrying 600 people and consisted of attractions such as garden decorations, a fitness center and a temple dedicated to the goddess Aphrodite, to name a few. Archimedes invented a screw to remove the bilge water to prevent the massive ship from leaking a substantial amount of water through the hull. Archimedes' screw could be described as a device with a spinning screw-shaped blade inside a cylinder. It was turned manually and could also be used to relocate water from a low-lying water body into irrigation canals. The Archimedes screw is still used to propel liquids as well as solids like grain and coal.

Read more at http://www.thefamouspeople.com/profiles/andre-marie-ampere-535.php#DFiB59YWBGGfmjBp.99

Works in Electrodynamics

In the month of September 1820, at regular meeting of the French Academy of Sciences, Ampere and his fellow mates were introduced to the staggering discovery made by a Danish physicist named Hans Oersted in electromagnetism. The discovery revealed the effects an electric wire had, on a magnetic needle. This in turn aroused curiosity in Ampere, who went ahead to research in the relationship between electricity and magnetism. Two weeks later, Ampere unveiled the results of his experiments in which he established that two parallel current-carrying wires attract one another when the direction of the currents is the same and they repel each other the direction is opposite. This was a path-breaking discovery and also laid the foundation of electrodynamics. He recorded all these discoveries in the weekly reports of the academy the same time he conducted his experiments. These reports were published in 'Annales de chimie et de physique', which is now regarded his first treatise on electromagnetism. He produced his second memoir before the academy in 1822.

His research and experiments were accepted widely and in 1826 he came published his 'Memoir on the Mathematical Theory of Electrodynamic Phenomena', which is considered the most significant scholarly work by Ampere. This publication served a source of ideas in the 19th century in relation to electricity and magnetism. Prominent scientists like Faraday, Weber, Thomson, and Maxwell had all found this treatise helpful while they undertook their research. Also for the first time the term 'electrodynamics' was coined in a pursuit of naming the new branch of science. He was elected a Foreign Member of the Royal Society in 1827 and in 1828 was appointed a foreign member of the Royal Swedish Academy of Science.

Heat Rays

Lucian, the 2nd century AD author, scripted that during the Siege of Syracuse (c. 214–212 BC) Archimedes shattered enemy ships with fire! After many years, Anthemius of Tralles wrote about burning-glasses as Archimedes' weapon. The device, also known as the 'Archimedes heat ray', was used to direct sunlight onto approaching ships, causing them to catch fire. Even a Greek scientist 'loannis Sakkas', conducted a test of the Archimedes heat ray in 1973. During this experiment, 70 mirrors were used, each coated with copper and about five by three feet (1.5X1 m) in size. The mirrors were faced at a plywood replica of a Roman warship, 160 feet (50m) far. When the mirrors were focused precisely, the ship burst into flames in a matter of few seconds.

Mathematics

The genius Archimedes was even capable of using infinitesimals in a manner similar to the modern integral calculus. Through proof by contradiction, he gave answers to problems to a great degree of exactness, while defining the boundaries within which the answer lays. This modus operandi is known as the method of exhaustion, and he employed it to find the approximate value of π. Archimedes also extended his intelligence in the measurement of circles when he gave the value of the square root of 3 as lying around 265⁄153 (approximately 1.7320261) and 1351⁄780 (approximately 1.7320512). The actual value is approximately 1.7320508, making this a very accurate calculation. In 'The Quadrature of the Parabola', Archimedes verified that the area encircled by a parabola and a straight line is 4⁄3 times the area of an equivalent inscribed triangle. He expressed the answer to the problem as an infinite geometric series with the common ratio 1⁄4.