building big things
archimedes

Archimedes is considered one of the three greatest mathematicians of all time along with Newton and Gauss. In his own time, he was known as "the wise one," "the master" and "the great geometer" and his works and inventions brought him fame that lasts to this very day. He was one of the last great Greek mathematicians.

Born in 287 B.C., in Syracuse, a Greek seaport colony in Sicily, Archimedes was the son of Phidias, an astronomer. Except for his studies at Euclid's school in Alexandria, he spent his entire life in his birthplace. Archimedes proved to be a master at mathematics and spent most of his time contemplating new problems to solve, becoming at times so involved in his work that he forgot to eat. Lacking the blackboards and paper of modern times, he used any available surface, from the dust on the ground to ashes from an extinguished fire, to draw his geometric figures. Never giving up an opportunity to ponder his work, after bathing and anointing himself with olive oil, he would trace figures in the oil on his own skin.

Much of Archimedes fame comes from his relationship with Hiero, the king of Syracuse, and Gelon, Hiero's son. The great geometer had a close friendship with and may have been related to the monarch. In any case, he seemed to make a hobby out of solving the king's most complicated problems to the utter amazement of the sovereign. At one time, the king ordered a gold crown and gave the goldsmith the exact amount of metal to make it. When Hiero received it, the crown had the correct weight but the monarch suspected that some silver had been used instead of the gold. Since he could not prove it, he brought the problem to Archimedes. One day while considering the question, "the wise one" entered his bathtub and recognized that the amount of water that overflowed the tub was proportional the amount of his body that was submerged. This observation is now known as Archimedes' Principle and gave him the means to solve the problem. He was so excited that he ran naked through the streets of Syracuse shouting "*Eureka! eureka!*" (I have found it!). The fraudulent goldsmith was brought to justice. Archimedes is often said to have discovered the lever, but humans had been using levers for thousands if not millions of years. He did work out the mathematics of simple machines and, in the process, may have discovered the compound pulley. According to the story, after he remarked, "Give me a place to stand on and with a lever I will move the whole world," Hiero challenged Archimedes to a demonstration. Archimedes obliged by using compound pulleys to launch single-handedly one of the largest ships made up to that time, complete with crew aboard. Another time, Archimedes stated "Give me a place to stand on and I will move the earth." King Hiero, who was absolutely astonished by the statement, asked him to prove it. In the harbor was a ship that had proved impossible to launch even by the combined efforts of all the men of Syracuse. Archimedes, who had been examining the properties of levers and pulleys, built a machine that allowed him the single-handedly move the ship from a distance away. He also had many other inventions including the Archimedes' watering screw and a miniature planetarium.

Though he had many great inventions, Archimedes considered his purely theoretical work to be his true calling. His accomplishments are numerous. His approximation of π between 3-1/2 and 3-10/71 was the most accurate of his time and he devised a new way to approximate square roots. Unhappy with the unwieldy Greek number system, he devised his own that could accommodate larger numbers more easily. He invented the entire field of hydrostatics with the discovery of the Archimedes' Principle. However, his greatest invention was *integral calculus*. To determine the area of sections bounded by geometric figures such as parabolas and ellipses, Archimedes broke the