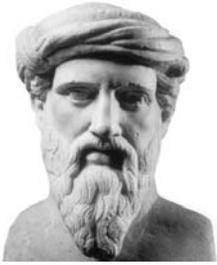**Reading: The Greek Mathematician - Pythagoras**

"The essence of all things is numbers" --- Pythagoras

Pythagoras (c.582 – 500 BC) of Samos is often described as the first pure mathematician. He is an extremely important figure in the development of mathematics. Unlike many later Greek mathematicians, where at least we have some of the books that they wrote, we have nothing of Pythagoras' writings. The society which he led, half religious and half scientific, followed a code of secrecy.
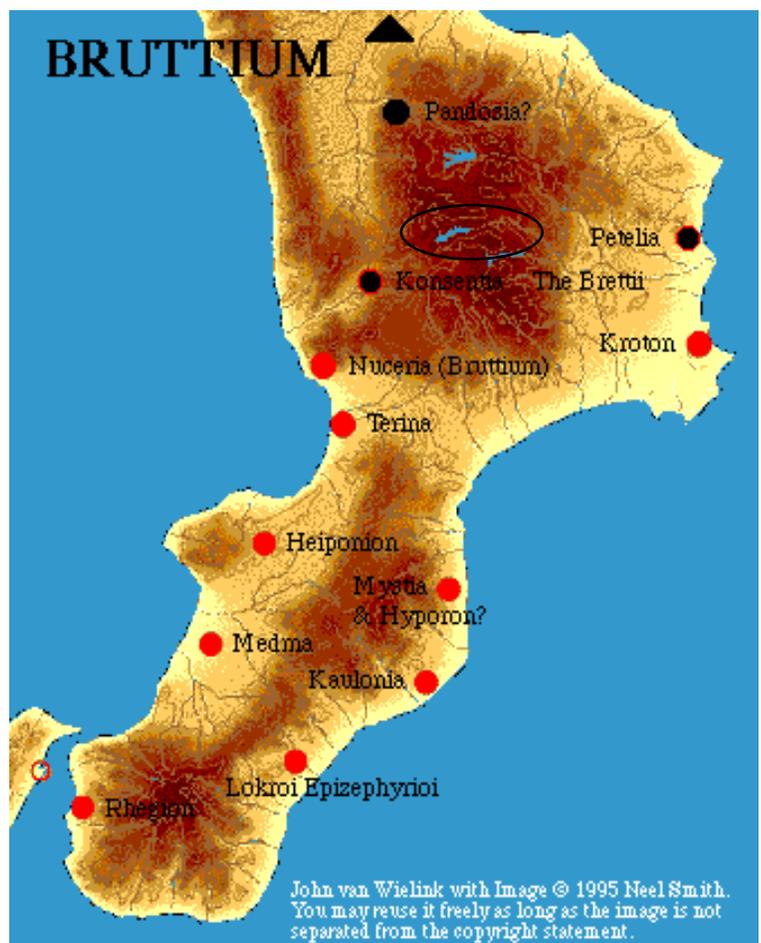
His School

Pythagoras was smart and well educated. One day Pythagoras was walking through the market and he was so excited about his mathematical discovery that he wanted to teach it to someone. He talked a boy named **Philocrates** into being his first student by offering him money.

In 529 B.C., he settled in **Croton** (now Crotone, port town, capital of Crotone provincia, Calabria regione, southern Italy). There he formed a philosophical and religious school called the **Pythagorean School** that had many followers.

Pythagoras was the head of the society with an inner circle of followers known as *mathematikoi*. The *mathematikoi* lived permanently with the Society, had no personal possessions and were vegetarians. They were taught by Pythagoras himself and obeyed strict rules.

Both men and women were permitted to become members of the Society, in fact later several women Pythagoreans became famous philosophers.

The outer circle of the Society was known as the *akousmatics* and they lived in their own houses, only coming to the Society during the day. They were allowed their own possessions and were not required to be vegetarians. The *akousmatics* were not allowed to see Pythagoras as he stood behind a curtain while he taught. It took three years before one could pass into the inner circle where they were allowed to see him.

In this famous painting, *School of Athens*, done by *Raphael* in 1510-11, **Pythagoras (Circle)** (c.582 – 500 BC) is explaining the musical ratios to a pupil.

Socrates sprawls on the steps at their feet, the hemlock cup nearby.

Plato the idealist (c.427 – 347BC), is on the left, pointing upwards to divine inspiration. He holds his *Timaeus*.

Plato's student **Aristotle**, the man of good sense, stands next to him. He is holding his *Ethics* in one hand and holding out the other in a gesture of moderation, the *golden mean*.

Euclid (c. 325 – 265BC) is shown with compass, lower right. He is the Greek mathematician who wrote *Elements*.

His Beliefs

(1) At its deepest level, reality is mathematical in nature.

(2) Philosophy can be used for spiritual purification.

(3) The soul can rise to union with the divine.

(4) Certain symbols have a mystical significance.

(5) All brothers of the order should observe strict loyalty and secrecy.

Little is known about the personal life of Pythagoras or his followers. Their symbol was a pentagram, a five-sided star that encompassed the golden ratio in so much of its structure. According to Pythagoras, five was the number of man, because of the fivefold division of the body, and the ancient Greek division of the soul. The five points of the **pentagram** each represent one of the five elements that make up man: fire, water, air, earth, and psyche.

In the Pythagorean School they believed that the bean and white rooster were sacred. They would not buy clothes made of wool because they believed the animals were the spirits of deceased people. He wouldn't drink wine, wear wool, poke a fire with iron, step on beans, eat meat, or pick up beans.

About Loyalty

In their ethical practices, the Pythagorean were famous for their mutual friendship, unselfishness, and honesty, as told in the following story.

A Pythagorean was taken quite ill at an inn while on a journey to a distant city. As he neared death, he showed the pentagram to the innkeeper and instructed him to post one on the wall of the inn. Should someone ask about the sign, the innkeeper was to relate the fate of the Pythagorean. When the Pythagorean died, the innkeeper posted the pentagram as instructed. In time, a guest to the inn asked about the pentagram. After the innkeeper related the account, the stranger, obviously a Pythagorean himself, repaid the innkeeper for all monies spent on the deceased Pythagorean's care and burial.

His Works

Pythagoras did all of his work in the sand. His students wanted to be secretive about what they learned so they called themselves the Brotherhood of Aristocrats. They did not write anything down and they were fiercely loyal to one another. Communalism made it hard to distinguish between the work of Pythagoras and that of his followers. Certainly his school made outstanding contributions to mathematics, and it is possible to be fairly certain about some of Pythagoras's mathematical contributions.

About Numbers

The Pythagorean, having been brought up in the study of mathematics, thought that things are numbers and that the whole cosmos is a scale and a number. To Pythagoras numbers had personalities which we hardly recognise as mathematics today:- masculine or feminine, perfect or incomplete, beautiful or ugly.

The number one was divine, the root of all other numbers and existence. Even numbers were feminine, odd numbers were masculine. Four represents justice, since it is the smallest number that fits into the configuration of a square. Five represented marriage, because it is a combination of the first feminine and masculine numbers. Six is a perfect number, made up of all its divisors and one [1+2+3 = 6]. Ten was the very best number: it contained in itself the first four integers - one, two, three, and four [1+2+3+4 = 10] - and these written in dot notation formed a perfect triangle.

The Last Years

Pythagoras's Society at Croton was not unaffected by political events despite his desire to stay out of politics. Pythagoras went to Delos in 513 BC to nurse his old teacher Pherekydes who was dying. He remained there for a few months until the death of his friend and teacher and then returned to Croton.

In around 508 BC, **Cylon**, a noble from Croton itself, attacked the Pythagorean Society at Croton. Pythagoras escaped to Metapontium and most authors say he died there, some claiming that he committed suicide because of the attack on his Society.

The evidence is unclear as to when and where the death of Pythagoras occurred. Certainly the Pythagorean Society expanded rapidly after 500 BC, became political in nature and also spilt into a number of factions.

This is all that's there to mark the Pythagorean's presence in Crotone.

http://www.dartmouth.edu/~matc/math5.geometry/unit3/unit3.html