1st Experimental High School of Thessaloniki "Manolis Andronikos"

Erasmus+ KA2

"Inventors and innovators: our heritage and our future"

HERON

Heron of Alexandria (c. 10 AD – c. 70 AD) was an ancient Greek mathematician, engineer and inventor, who was active in Alexandria, the city where he was born. He is considered the greatest experimenter of antiquity and his work is representative of the Hellenistic scientific tradition. Some of his ideas were derived from the works of Ctesibius.

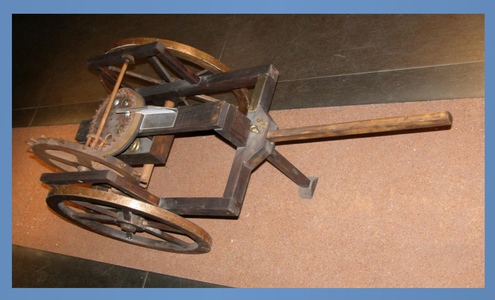
His works draw on a wide range of sources, written in Greek, Latin, and Egyptian, and he added his own ideas to this solid basis. Heron's writings in mathematics and mechanics reveal that he was practical by nature, often using ingenious means to attain his goal, such as his design for a steam engine, war catapults and various machines for lifting, that used compound pulleys and winches.

Of Heron's books on mechanics, all that remain in Greek are Pneumatica, Automatopoietica, Belopoeica, and Cheirobalistra. In the *Belopoeica* and the *Cheiroballistra* he describes explicitly the war machines of his time, especially catapults, weapons that composed the defensive mechanism of his city, Alexandria.

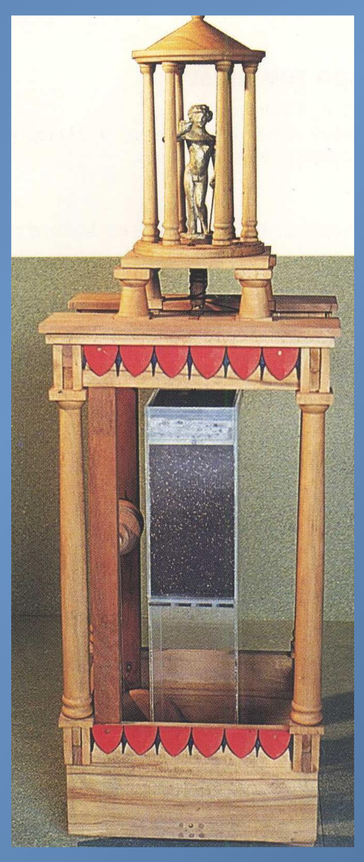
His most impressive books are the Pneumatica and the Automata. *Pneumatica* is a collection of around 80 mechanical apparatuses, that work with air, steam or hydraulic pressure. *Automata* is a collection of constructions called miracles (thaumata) for temples. Heron describes automatic rotating objectives, noise such as thunder, automatic opening and closing doors, statues that pour wine, singing birds etc. In his work there is a variety of measurement organs, automated machines, elevating mechanisms and aeolipile, a more archaic version of a steam working machine.

1. Heron invented the first known **automatic opening and closing doors**. His famous application used heat from a fire lit by the city's temple priest under the altar. After a few hours atmospheric pressure built up in a brass vessel causing it to pump water into adjacent containers. These containers acted as weights that, through a series of ropes and pulleys, would open the temple's doors.

2. Heron's invention was also an **elevating mechanism,** which could elevate statues.



3. The **odometer**: Heron describes how the wheels on chariots could be used as a car odometer



4. The **mobile automatic theatre** of Heron . Fire was lit on the altar in front of Dionysos. Water springs from his holy stick and wine from his cup was poured onto the small panther. The place around the four columns of the base was crowned with flowers. The sound of drums and cymbals were heard while the six Bacches moved dancing around the temple.

5. The **fountain with the mechanical singing birds**

6. **Strepton was** a union of a catapult (as a source of power) and a force pump, an invention of Heron. The combination of these two mechanisms had as a result the creation of a firefighter, which launched Greek fire (Egron Pyr), something like naphtha, in a distance of about 30m.

7. Heron;s aeolipile was a more archaic version of a steam working machine.

8. The statue of a servant, which was able to pour wine automatically from a jar in a cup.

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Source of the photos 1-8 :
1,2,3,5,7 : Personal photos from the Exhibition IDEA (Sponsor: Stavros Niarchos Foundation) in the NOESIS Science Center and Technology Museum ,Thessaloniki
4: Αρχαία Ελληνική Τεχνολογία, Τεχνικό Μουσείο Θεσσαλονίκης, Εταιρεία Μελέτης Αρχαίας Ελληνικής Τεχνολογίας, Thessaloniki 2000, 55
6: Noesis: archive.noesis.edu.gr/repository/handle/11609/001-03109
8. TO BHMA science (journal) 7.1.2018, 5 fig.