

European Path (e)Motion – Senior High School of Thesprotiko

Work Sheet 2: Aqueducts

Name : Date:

A. Useful Knowledge

Supplies of water are needed by any community. Villages and small towns can obtain water from wells, springs and streams. As Roman cities developed in a region where drought was often a problem, more sophisticated ways of supplying water were needed. The Romans believed that polluted water harmed the health of their citizens so they developed a system which used aqueducts and sewers to keep the people healthy.



Roman aqueduct of Nicopolis.

Aqueducts could be built at ground level as channels cut through rock or below the ground using pipes. Pipes were difficult to clean and probably more expensive than aqueduct bridges with simple channels if ongoing maintenance was taken into account. Aqueducts were built up high on huge arches of brick and stone and sloped down from the water source. The slope had to be very gradual if the source was some distance from the community. Water from the aqueduct first flowed into settling tanks where sand and other sediment settled to the bottom.



Naumachie in Taormina.

B. Concepts

Hydrostatic Pressure (P) : We call the pressure which is caused by the weight of fluid. Without gravity there isn't hydrostatic pressure. It increases in proportion to

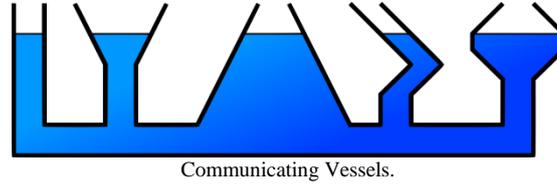
- i. depth (h) measured from the surface.

- ii. fluid density (ρ).
- iii. gravity acceleration (g).

Hydrostatic pressure can be expressed mathematically by the equation :

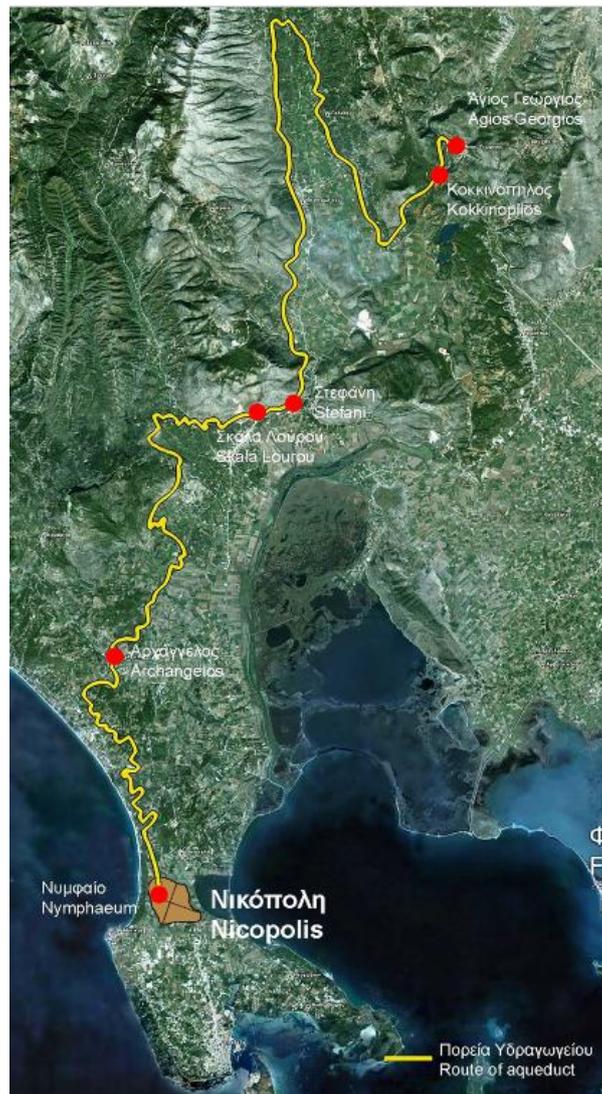
$$P = \rho gh$$

The law of the communicating vessels : In the communicating vessels the free surface of the fluid is at the same horizontal level.



C. The aqueduct of Nicopolis

At the village of Saint George, Preveza near the springs of river Louros a huge aqueduct was constructed to cover the needs of ancient Nicopolis. Nicopolis was founded in 30 BC by Octavian Augustus in remembrance of the victory during the naval combat of Action. Its population was about 300.000 inhabitants. The Roman Aqueduct had to transfer water to a distance of more than 50Km. This transfer was really difficult because they had to get over obstacles such as valleys, hills and mountains. This is why along these 50Km today we see ruins of tunnels, bridges and arches.



The route of the Roman Aqueduct of Nicopolis.

D. Working with aqueducts

- Given that 2000 years ago there were no pumps, how did the Romans succeeded in having a stable flow from Louros springs to ancient Nicopolis?

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- How did the Romans overcome the obstacle of river Louros valley?

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The river Louros valley.

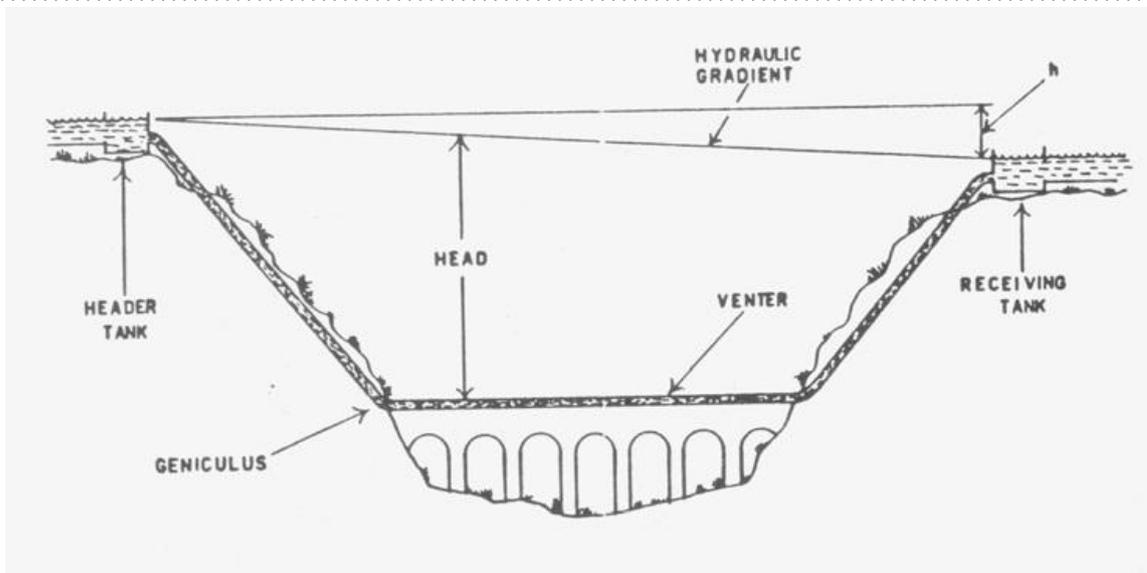
- Many times after going through valleys the water had to flow above hills to continue its route. With the help of the following scheme and laws of physics describe how the water goes up the hill.

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Channel crossing a valley : scheme of a **siphon** arrangement (Hodge, 2002).

- In the area of Kokkinopilos they had to open a tunnel in order to cross the mountain with the suitable slope. Big wells that ensure access in the tunnel were built in the tunnel.

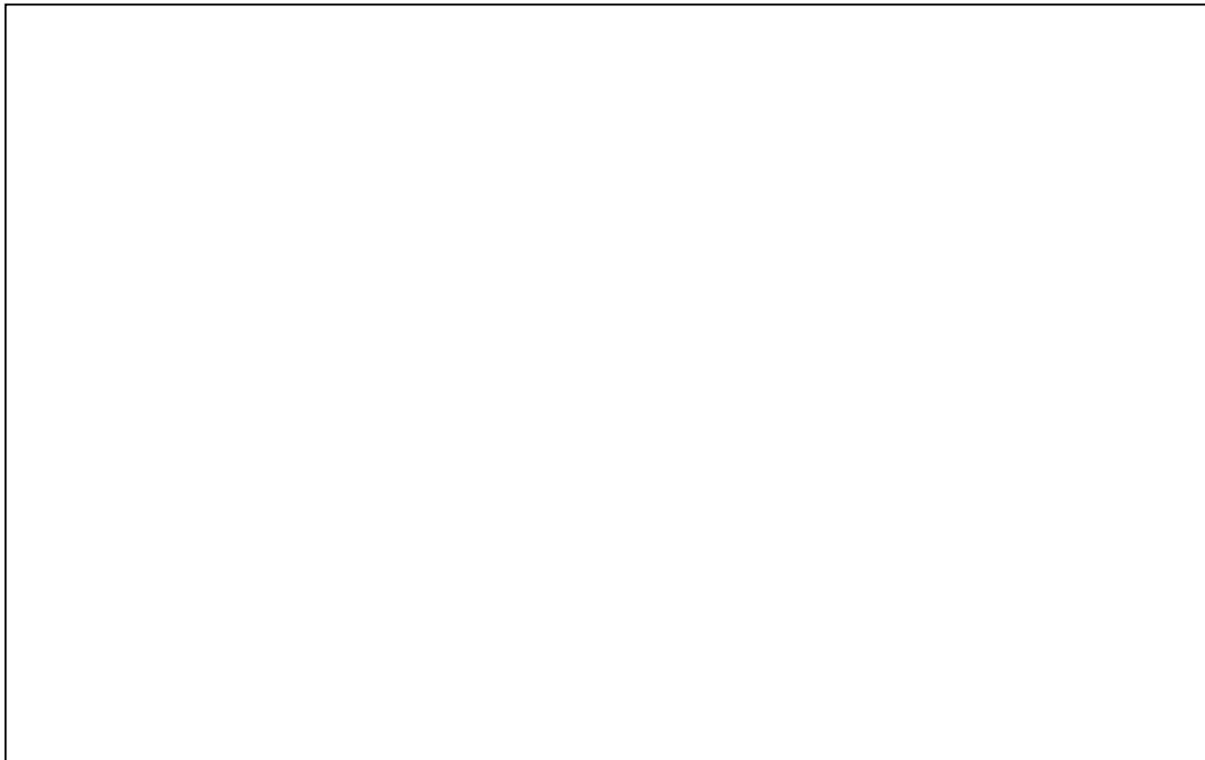


Tunnel in the area of Kokkinopilos.

Can you refer advantages and disadvantages of these aqueducts tunnels?

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- Make a drawing where the route of the water can be seen.



The Ancient Roman Water Supply System.

- Can you describe a way of cleaning the water at the aqueduct?

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