ROMAN TECHNOLOGY – AQUEDUCTS

The Romans began to build aqueducts around 312 B.C. in order to carry water to Rome, but the ancient Assyrians had constructed an aqueduct about 400 years before that date to provide water for the city of Ninevah. Ten main aqueducts carried a continuous flow of water to Rome. One of them, the Aqua Claudia, carried spring water from the Appenine mountains and its ruins can still be seen today. Most of the Aqua Claudia was underground so the water could not be accidentally contaminated or deliberately fouled by Rome's dissatisfied poorer citizens. The underground channels were normally only half filled with water so there was room to remove the deposits of calcium carbonate which narrowed the channels and restricted the water flow.

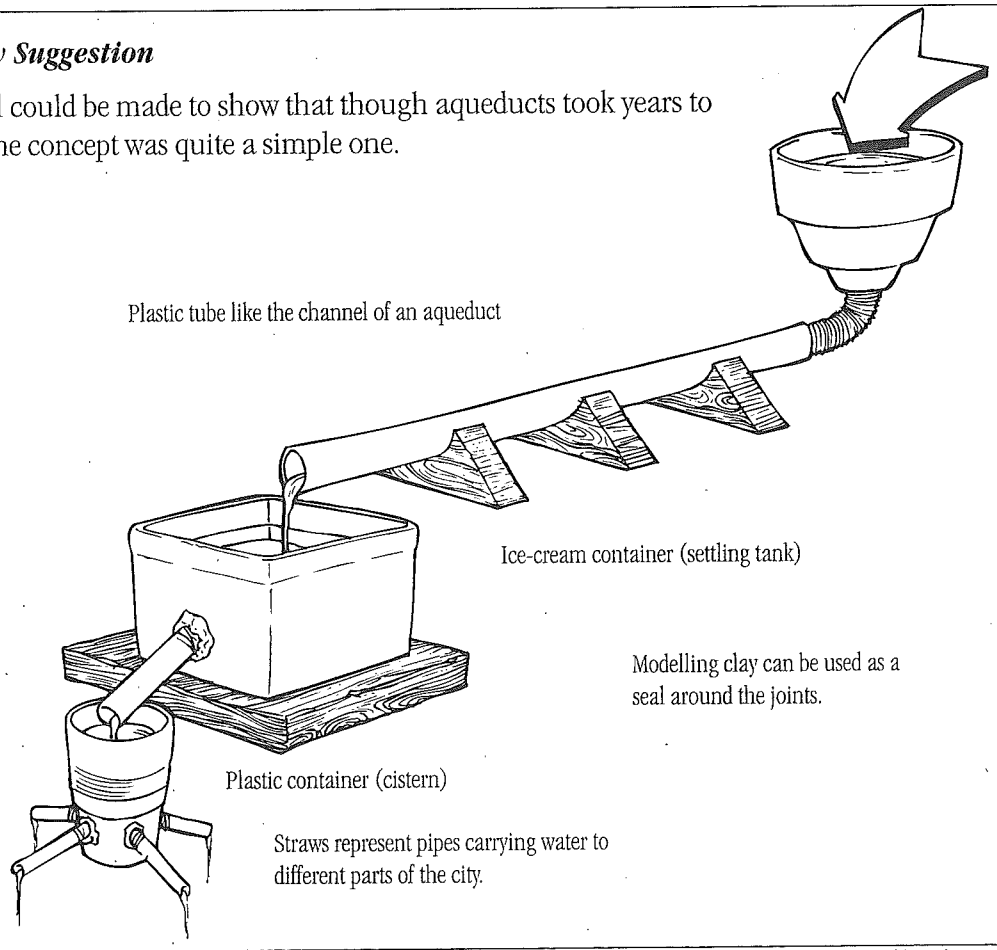
The Pont du Gard Aqueduct in Southern France ran for about 50 km and supplied water to the city of Nimes. It was built by Marcus Agrippa, an engineer and soldier, and stood 48 meters above a valley. Another aqueduct rises above Segovia in Spain, but the most impressive in Roman times was one which carried water across mountains and desert to the city of Carthage in North Africa. Its length was over 200 km and many sections still stand today.

Roman plumbing used many lead pipes and tanks and even then a brilliant engineer called Marcus Vitruvius was sounding a warning about the danger to health of lead in water. The common alternative was ceramic pipes built in sections and then linked together. The joints were sealed with a mixture of quicklime and oil.

In 1850, Paris engineers were still using aspects of a water supply system worked out by Frontinus, a Roman aqueduct designer.

Activity Suggestion

A model could be made to show that though aqueducts took years to build, the concept was quite a simple one.



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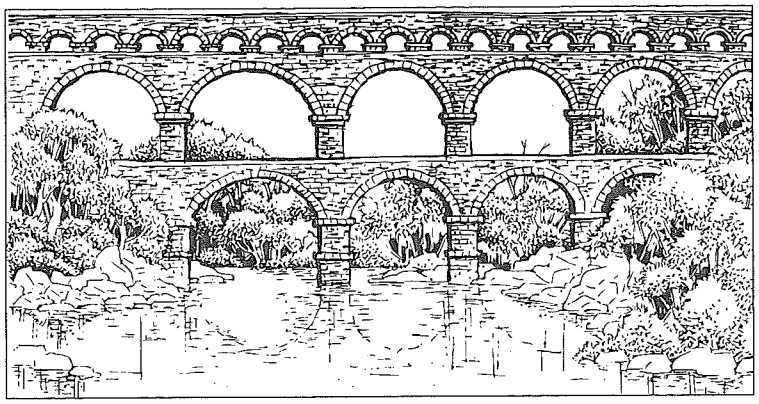

This Roman aqueduct still stands in France and took years to build. It is raised up high on an arched bridge and the blocks of stone fit so tightly no mortar was used to hold them together. Some blocks weigh over 5 tons and were raised into position by cranes powered by slaves on treadmills.

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.

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. Wherever possible, Roman engineers used gravity to carry water from a source to a city. Such 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. In Rome, they carried millions of liters of water daily into the public baths, fountains and homes of the wealthy citizens. Householders had to pay for the water supplied with payments based on the diameter of the pipe delivering the water. Water from the aqueduct first flowed into settling tanks where sand and other sediment settled to the bottom.

There were excellent sewerage systems in Rome, some still in use today. Large stone tunnels would flush waste products into the River Tiber, using flowing water brought in along aqueducts.

Activity Box

Answers to the questions are found above.

1. What are settling tanks for?

   _____

2. Why were aqueducts often built at a high point?

   _____

3. How were rich citizens charged for water?

   _____

   _____

4. The Romans used aqueducts to clean out waste products in . . .

   _____.

5. Name the original water sources mentioned.

   _____

6. Water was important to Rome for the region often suffered from . . .

   _____.

7. Where would Rome's sewage end up?

   _____

8. What were the important curved structures in the aqueduct?

   _____

9. What did the Romans believe harmed their health?

   _____

10. Which part of the aqueduct system would have been difficult to maintain?

    _____