

Eureka!

There are stories of historical figures that are known thanks to ancient writings. One of these is related to Archimedes and Hiero II, the king of Syracuse, 2,250 years ago. Hiero II asked an artisan to make him a crown from a specific amount of gold. The weight of the crown was exactly equal to that of the gold originally provided. But Hiero II wanted to know if the artisan had used all the gold supplied, or if he had replaced some of the gold with silver. So he assigned Archimedes, a brilliant mathematician, this challenge.

And there was one more condition: the king did not want the crown damaged.

After giving this much thought, Archimedes decided to take a bath, and while he observed the water coming out of the bathtub as he got in, he found the answer to the king's question. The Greek mathematician noticed that the amount of water coming out of the bathtub was the same, in volume, as the space occupied by his body. That made him think of the method he could use to find out if the king's new crown was made completely of gold.

He was so happy about his find that he went running naked through the street shouting "Eureka! Eureka!" (This in Greek means "I have found it!").

The Greek mathematician had discovered in the bathtub that the volume of water displaced is proportional to the density of the submerged object. That meant that because both crowns weighed the same, but the artisan's one displaced more water, the other had a greater volume. After this verification he gave Hiero II the news: the artisan had cheated him.

This story is known thanks to Vitruvius, a Roman architect, writer and engineer of the 1st century BC (some people have doubted the accuracy of this tale because Archimedes had the habit of writing all the ideas he discovered). Perhaps Archimedes applied the principle of buoyancy to show the crown was less dense than gold. To check it, you would have to submerge the crown and a gold bar of the same weight in water, using a brass scale. If the scale becomes unbalanced, it means both objects react differently to the hydrostatic pressure of the water, and it means that they have different volumes and densities.

Reading comprehension and reflection

1. Translate the following words from the text into Catalan. Use a dictionary if you need to.

a) Greek	f) Weigh
b) Amount	g) Buoyancy
c) Replace	h) Less
d) Crown	i) Bathtub
e) Artisan	j) Cheat

2. What did Archimedes see when he entered the bathtub?

3. Which has a higher density, gold or silver?

4. Would a silver crown with the same weight displace more or less water than a pure gold crown?

5. Activity in pairs. Archimedes was a great Mathematician and an inventor. Find information about him and prepare a display.