

## Student's Learning Activities (Democritus and the atoms)

### Activity 1

You will watch a video with narration or listen to a story from your teacher about the ancient philosophers Democritus and Plato. Please write down the main points of the story, and discuss about them in your group. (Indicative important points of the story: Plato's views about the material bodies, the atomic theory of Democritus,.....)

The most important points of the views of Democritus and Plato about the structure of matter are:

A) Atomic theory of Democritus

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B) Plato's views about the material bodies

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C) Please compare the views of Democritus and Plato about the vacuum.

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**Activity 2**

Based on the text below please highlight and discuss in your group the factors that contributed to the prevalence of Aristotle’s view.

«Plato’s perceptions about the structure of matter i.e. that the world consisted of four elements: water, air, fire and earth, were supported by Leucippus and Aristotle. Aristotle added a fifth element the aether, which fills the space between the heavenly bodies. Democritus’ perceptions were not accepted by his contemporaries for two reasons because: a) the called “atoma” were not visible, so there was no proof for their existence and b) Aristotle's theory could explain his observations based on the above principles, whereas atomists were not able to offer a convincing explanation for the existence of particles that no one could see. This was a significant point of criticism of Aristotle against the atomic theory, beyond the fact that he himself did not accept the idea of empty space, which according to his perception was impossible to exist. The view of the supporters of the existence of permanent motion (constant movement) was considered unreasonable by Aristotle. However, Aristotle is related to the development of the modern atomic theory in the following sense. While the original work of Leucippus and Democritus was lost, it came to be known through Aristotle’s criticism. The works of Aristotle, were stored and disseminated in the Islamic culture, and through it, they came back to Europe and the Christian civilization. For the scholastic period, this acceptance of Aristotle’s work became dominant, especially because it was considered to be consistent with the Bible. At the end of the 18th century it was believed that experimentation could contribute to the research of the laws of nature and structure of matter. So for example the discussions around the premise that if in a room there is burnt a very small amount of incense, the smell reaches all over the room which is much larger than the space originally occupied by the incense...».

1. Identify the role played by religious beliefs of people in the medieval times to make Aristotle’s view to prevail and Democritus’s view to be overlooked. List the factors that contributed to challenging this view.

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2. Express your views about what a scent is.

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3.Explain how burning a small amount of incense in a room can be proof that matter consists of particles.

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**Activity 3**

In the above text is quoted: "...At the end of the 18th century it was believed that experimentation could contribute to the research of the laws of nature and structure of matter" please discuss in your team this view. Research in the internet to find important experiments in the history of science, which were milestones for the development of science, and write some of them. Discuss in your team about the role of experiment in the progress of science.

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#### **Activity 4**

Discuss in your group the phrase: «In the room there are small particles that are constantly moving». Suppose that you can see any particle regardless of its size, then draw and explain what these particles are and how they move.

#### **Activity 5**

Based on a web research, write a text about modern scientific views concerning the structure of matter.

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#### **Activity 6**

According to Democritus and Leucippus: "With specific combinations of atoms new substances are created". Is this axiom proven today or not? If your answer is yes, please indicate how these substances are called. Name five examples of such substances.

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