

# Student's Learning Activities (Guericke and vacuum)

## **Activity 1**

You will watch a video with narration or listen to a story from your teacher about Otto von Guericke and his experiments in order to demonstrate the existence of vacuum. Please write the most important points of the story according to your view and discuss them in your group. (Indicative important points of the narration: Otto's repeated experiments for the existence of vacuum, the prevailing scientific views of that time on the motion of Sun and Earth, Otto's questioning about the views of the Aristotle for the vacuum, Otto's behaviour which brings out his personality as scientist,)
Activity 2 Based on the narration, write a text about the Otto's experiments for the barrels and the sphere in order to demonstrate the existence of vacuum. Furthermore you could have some more information in the website about the work of Otto (in German): <a href="http://www.youtube.com/watch?v=ZhFpez0na">http://www.youtube.com/watch?v=ZhFpez0na</a> w



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Activity 4





storytelling Using two hydraulic suction cups, please try to simulate the Magdeburg Hemispheres. How many members of your team were required to separate the two hemispheres?



## **Activity 5**

The photograph bellow shows a hydraulic suction cup "glued" onto a plastic plate glass (plastic glass sheet). The commonly heard explanation is: "air weight pushes the rubber hemisphere on the surface." If the panel is reversed (with the suction cup hanging), what would consider as likely to happen? Please discuss your answer with other members from your group. Once all answers are discussed you will be provided by your tutor with an actual suction cup and a plate. Verify your prediction.



#### **Activity 6**

Please watch the experiment at <a href="http://www.youtube.com/watch?v=YjfWTo75THs">http://www.youtube.com/watch?v=YjfWTo75THs</a> . It looks quite similar
to the 'two hemispheres' experiment.
What replaced the air removal pump?

# Activity 7





Please visit <a href="http://www.aps.org/publications/apsnews/201210/physicshistory.cfm">http://www.aps.org/publications/apsnews/201210/physicshistory.cfm</a>. Study the text about the history of theoretical considerations regarding the vacuum and fill the table below.

Scientists Name	Time period	Country	Views about the vacuum
	lived	worked	
Plato			
Aristotle			
Evangelista			
Torricelli			
Blaise Pascal			
Otto von Guericke	(1602-1686)	Germany	
Various	21 century	Various	In the twentieth century, physicists went
		Countries	far beyond this. What they found was not
			an "empty place, wherein no substance
			should be," but rather a vacuum filled
			with wonders: electromagnetic radiation
			(including that from the last gasp of the
			Big Bang), a sea of virtual particle-
			antiparticle pairs, a space bent out of
			shape by gravitational warping – all these
			unimaginable to earlier physics and
			physicists.

#### **Activity 8**

Using the list of ideas that describe the characteristics of science and the ways it develops, try to locate and write these ideas in the story you heard and the activities of this lesson. These ideas that scientists call Nature of Science (Nature Of Science-NOS-) are:

Characteristics of Nature of Science (NOS)

- 1. Science demands and relies on empirical evidence.
- 2. Knowledge production in science includes many common features and shared habits of mind.
- 3. Scientific knowledge is tentative but durable.
- **4.** Laws and theories are related but distinct kinds of scientific knowledge.
- 5. Science is a highly creative endeavor.
- **6.** Science has a subjective element.
- 7. There are historical, cultural, and social influences on science.
- 8. Science and technology impact each other, but they are not the same.
- **9.** Science and its methods cannot answer all questions.

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# **Activity 9**

Please visit the website: <a href="http://www.eoht.info/page/Nature+abhors+a+vacuum">http://www.eoht.info/page/Nature+abhors+a+vacuum</a>. Use the material found on the page for the design of posters about the evolution of ideas on space and experimental devices, as invented by scientists.

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