

		 VRIJE ASO.SCHOOL
<h2>Mars, here we come ...</h2>		
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EXPERIMENT:changingof buoyancy (force of Archimedes)		

RESEARCH QUESTION

On different planets, gravity is different. This means that you are attracted to the surface in a different way. We can simulate this by doing experiments on the buoyancy (force of Archimedes)

- What happens with the resultant force on an object if you put the object in a liquid?
- In which liquid is the weight reduction the strongest: in distilled water, in salt water or in oil?
- On Mars, gravity is less than on Earth. If distilled water represents the conditions on Earth, which of the other liquids would represent the conditions on Mars?

HYPOTHESIS (indicate the correct answer)

If you put an object in a liquid, the resultant force on the object is smaller / bigger than the gravity.

The weight reduction of a cube is the strongest in distilledwater / salt water / oil.

On Mars, gravity is less than on Earth. If distilled water represents the conditions on Earth, the conditions on Mars are represented by salt water / oil.

MATERIAL

- Tripod and clamp
- Cube and two different nuts
- force-sensor (LabQuest)

Mars, here we come ...



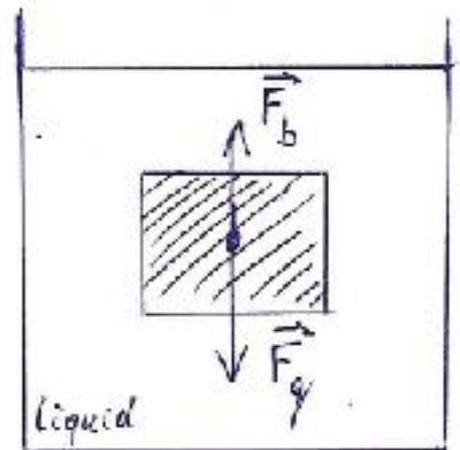
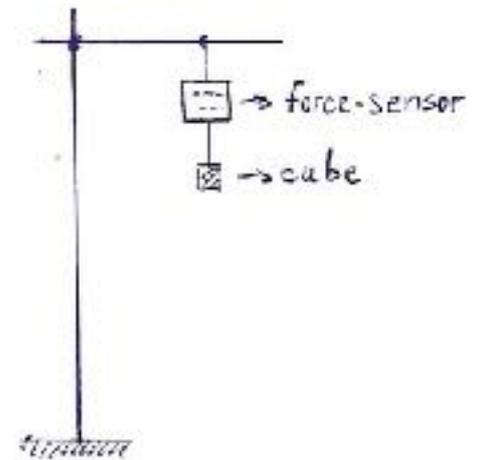
- three measuring cups
- distilled water – salt - oil

OPERATION OF THE EXPERIMENT

- Measure the gravity of the cube.
- Hang the cube in the different liquids and measure the resultant force.
- Repeat the experiment with the nuts.

THE RESULTS:

- ❖ Doing the experiment
 - Make the measurement set-up with the cube and the force-sensor (see figure).

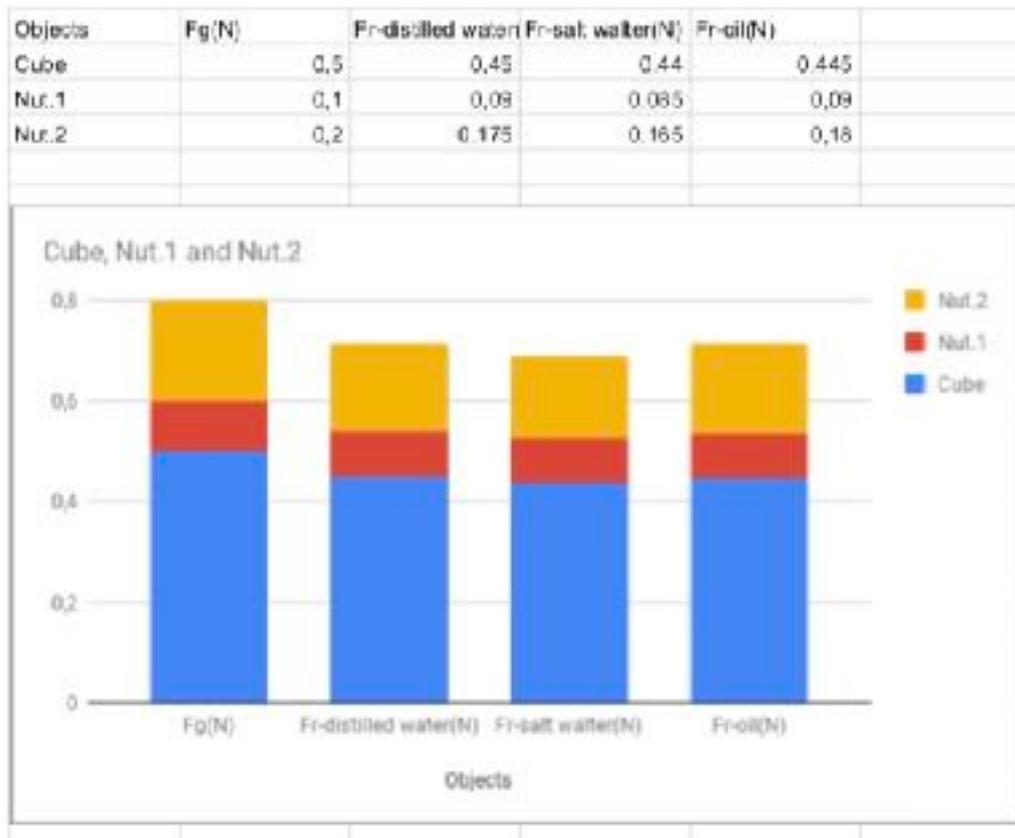


- Read the gravity (F_g) of the cube.
- Fill one of the measuring cups with 200 ml of distilled water.
- Hang the cube in the water and measure the resultant force on the cube: resultant force (F_r) = gravity (F_g) – buoyancy (F_b).
- Fill another measuring cup with 200 ml of distilled water and add 100 g of salt. Hang the cube in the saltwater and measure the resultant force on the cube.
- Fill the last measuring cup with 200 ml of oil. Hang the cube in the oil and measure the resultant force on the cube.
- Repeat the experiment with the two different nuts.

❖ Complete the chart

	F_g	F_r – distilled water	F_r – salt water	F_r – oil (sunflower seeds)
cube	0.500 N	0.450 N	0.440 N	0.445 N
Nut 1	0.100 N	0.095 N	0.085 N	0.090 N
Nut 2	0.200 N	0.175 N	0.165 N	0.180 N

- ❖ Make column charts (excel) of the different resultant forces. Copy the graphs in this document.



CONCLUSIONS

Mars, here we come ...



- If you put an object in a liquid and you compare the resultant force with the gravity you notice that **it decreases**
- The weight reduction of an object in a liquid is the strongest in **salt water**
- On Mars, gravity is less than on Earth. If distilled water represents the conditions on Earth, which liquid represents the conditions on Mars? **Salt water**

REFLECTION

- How do you explain the conclusions?

The density of salt water is lower than the densities of distilled and water and oil. That means that the pulling-up force the object receives is stronger and that's why the buoyancy changes, making the object float.

- Compare your results with the results in the other school. Do you have the same results?

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